THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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THE EMPLOYERS' PARLIAMENTARY COUNCIL.

RECENT events in the labour world have shown that just as it is necessary for Trade Unions to combine, so it is essential for employers to put their heads together for the protection of their common interests. We are, therefore, glad to notice that the Employers' Parliamentary Council is about to direct its energies to obtaining such a modification of the law as will prevent useless labour disputes. The settlement of the Irish Railway Strike *on the employers' terms* shows what can be done by a little firmness. The directors had but little support from the Government, but they were backed by public opinion; the strikers, on the other hand, were backed by the Amalgamated Society of Railway Servants. To judge from the result of the strike, railway directors need not in future have much fear of any such *vis a tergo*. The reputation of the officials of this august body has not been enhanced by the ignominious part which they have played. It will be said, of course, that Ireland has taught England a lesson; and that, if the directors of our railways had only held out in August, victory would have been theirs. The circumstances, however, were widely different. At the time when the famous "24 hours telegram" was sent, affairs concerning Morocco were in a ticklish condition. In consenting to meet the Trade Union representatives in Conference with Cabinet Ministers, it has been suggested that the directors conceded the principle of recognition up to a point. But it appears that Sir Guy Granet and Mr. Claughton met the Union representatives at the request of the Government. When giving evidence before the Royal Commission, Sir Guy was asked by Mr. Henderson whether this did not amount to recognition. He replied, "No. Here was a case in which, under very special circumstances, to which I am not permitted to allude, but which are not likely to recur, and at the earnest solicitation of the Government as a special case, we were authorised to meet the representatives of the unions."

What were the "special circumstances?" The strike came to an end on Sunday, August 20th, the terms of settlement being announced in the Press on the following day. On August 19th the following passage appeared in the *Times* under the heading, "The Franco-German Negotiations."

> There are reasons for believing that one of the considerations which influenced the German Foreign Secretary in suspending the negotiations was a desire to wait and see the development and the effects of the English Labour trouble. The sense of British support in accordance with treaty engagements and British interests has greatly strengthened the French position from the beginning, and the German statesman, who is known to be very imperfectly acquainted with British affairs, may easily have imagined that something was to be made out of the present situation in England.

Does not this note give us some clue to the "special circumstances" to which His Majesty's Government would not allow Sir Guy Granet to allude? Was not the prospect of a European war, a "special circumstance" which was not likely to recur?

Having regard to these considerations, it may be assumed that if there had been no war cloud on the horizon, the

English directors would have been before and not behind their Irish colleagues. In fighting to a finish they would have met with the approval of the nation at large.

The whole trend of public opinion appears to favour the course which the Employers' Parliamentary Council is about to adopt. It would endeavour to secure a modification of the law with regard to picketing. "Peaceful picketing" was the Parliamentary method of persuasion which made these disastrous strikes possible.

The Trades Disputes Act, 1906, was forced through Parliament, because it was said to represent "the will of the people." It was for that reason that men of wide knowledge and experience allowed it to be placed on the Statute Book. But there were statesmen among them who did not assent to the measure without a word of warning. Conspicuous among them was Lord Halsbury, who said :—

> This is a Bill for the purpose of legalising tyranny; for the purpose of taking people outside the ordinary Courts of Law. I do not want to be a prophet of evil, but I cannot help saying that this Bill is likely to produce commercial distress, and extremely likely to produce the sort of warfare in an intense degree which appears to be contemplated it may produce. It may be also that it will drive justice from her seat. I do not want to be a prophet of evil; I dare say that, notwithstanding such a Bill, we may recover ourselves, but I believe it will be after much suffering and much injury. It may also take us a long time to recover. I believe in my conscience that if Parliament passes the Bill, it will strike a serious blow against the spirit of freedom which has hitherto reigned throughout our laws.

If the statesman is he who looks five or six years ahead, may not those who assented to this measure have done so in order to give the people a salutary lesson? We have already had some of the "suffering" and "much injury." Picketing is a species of mob law. Was it not wise to show people the danger of being ruled by the mob?

In embarking upon its course, we doubt not that the Employers' Parliamentary Council will enlist the sympathy and support of the silent ones among the people who can think for themselves. Those who are concerned with the electrical world have their own troubles to contend with, but they are bound to share the larger trouble foreshadowed by a general strike.

The loyalty which employers in "our own trade" have shown towards one another in the past gives earnest that those of them who take an active interest in politics would form a useful sub-committee in the general committee of the Employers' Parliamentary Council.

The B.E.A.M.A.

The inauguration of the regenerated National Electrical Manufacturers' Association under its new title—the British Electrical and Allied Manufacturers' Association (Incorporated)—which was celebrated by the customary dinner on Thursday last week, is an event which must be regarded as one of the first importance to the electrical industry in this country. It is true that the parent Association existed for some eight or nine years without accomplishing any very notable achievements, except in matters of detail, and without leaving any very marked impression upon the surface of the industry; but its ineffectiveness was no doubt due largely to deficiency of means and lack of adequate support—for many of the most important manufacturing concerns stood aloof from it, and without their co-operation it was impossible to carry out any considerable programme for the benefit of the electrical industries. The new organisation, however, has been established upon a wider basis; the subscriptions have been very materially increased, efforts are being made to include as members all the large firms coming within the scope of the Association's Articles, and a new scheme of administration and organisation is about to be put in force.

The Association, therefore, sets forth upon its new career with, it is to be hoped, vastly improved prospects of doing good work on behalf of its members, and great potentialities for the development of the British electrical and allied industries on sounder and saner lines than they have hitherto followed. In giving it a cordial send-off, the chairman, Mr. Ferranti—whose presence at the dinner as President of the Institution of Electrical Engineers may be considered as conferring upon the Association the blessing of the Institution—referred in characteristically plain terms to the absurdity of the cut-throat price competition which has so long been in vogue, and welcomed the prospect of co-operation due to the efforts of the Association. It was generally anticipated, we believe, that in his response to the toast of "The Association," the chairman, Mr. Nalder, would unfold to his expectant audience some outline of the policy and plans of the new body, but this assumption proved unfounded; not only Mr. Nalder, but Mr. Anderson and Mr. Hirst, who followed later, refrained most carefully from revealing the concrete intentions of the Council. Abstract declarations of determination to do great things for the allied industries there were in plenty, but nothing definite. The general impression left upon our minds, however, may be stated, viz. :—That the Council, while explicitly repudiating any intention of dabbling in fiscal questions, intends to exert its influence towards inducing purchasers of plant to place their orders with British manufacturers, and to mitigate as far as possible the severity of competition at present prevailing amongst the latter. These are most commendable objects—they are identical, in fact, with the policy that we have advocated in these pages for many years, and therefore command our most cordial approval and support. Our only regret is that no information was given as to the ways and means to be adopted by the Council. In the meantime, we must congratulate the Association upon its auspicious inauguration, and for the rest—in the words of one of the speakers at the dinner—we must "Wait and see."

Conciliation in Trade Disputes.

In pursuance of an attempt to calm unrest in the labour world, the Government has decided to form a panel of conciliation, from amongst whom a few are to be chosen to advise with the Board of Trade when occasion arises. The list includes 13 representatives of employers, and the like number of persons representing the men. All the workman representatives, without a single exception, are trade union officials, while the employers are chairmen, &c., of employers' associations. Sir G. R. Askwith, of the Board of Trade, is to preside over the new body, which is to be styled the "Industrial Council."

We have had too much experience in recent years of trade union men and methods to hail this new creation with much enthusiasm. Like every other conciliation board ever invented, its decrees will have no sanction. The union leaders on the one hand, and the masters in a particular industry on the other, may consent to abide by any judgment pronounced; but the men cannot, by any means known to the law, be compelled to act in accordance with an unfavourable award. Nor is it certain that the labour representatives on this Council represent anyone but themselves. They are there, not as delegates, but in their individual capacity. Finally, almost before the ink was dry on the agreement under which this Council is constituted, the labour leaders have begun to "crab it." Thus Mr. Appleton, secretary of the General Federation of Trade Unions, writes :—

> I fear that it would tend greatly to cause delay in the settlement of disputes, and that is all against the interests of the workman, since it enables the employer to provide means to checkmate the workman's weapon of a strike.

In expressing the fear that the workman might be deprived of the strike as a weapon, Mr. Appleton drew attention to the reason why conciliation has proved to be of little use in the past. It is interesting to notice that the birth of this conciliation board coincides with the death of another :—

> After an existence of over 20 years, during which period it has settled scores of disputes between employers and employed, the North-East Coast Marine Engineers' Conciliation Board has been dissolved. The jurisdiction of the board extended from Blyth to Whitby. One by one the employers' associations have seceded from the board, until at its last meeting the men's representatives only were present, and the board was declared to be at an end.

THE ELECTRICAL CONGRESS AT TURIN.

In order to cover as wide a field of investigation as possible, the sittings of the Congress took place simultaneously in seven divisions or sections, whose deliberations were directed as indicated by the following headings :—

Section I.—Electrical machinery and transformers.
Section II.—Central stations and cables.
Section III.—Instruments and insulation.
Section IV.—Electric lighting and heating.
Section V.—Electric traction.
Section VI.—Telegraphy and telephony.
Section VII.—Accumulators and electrochemistry.
Section VIII.—Taxation and legislation affecting the electrical industry.

On the first day, September 11th, in the first Section, Prof. Silvanus P. Thompson read a paper entitled "A Report on Motor-Generators, Converters and Rectifiers." This report treats of (*a*) motor-generators with two field-magnet systems and two armatures ; (*b*) motor-generators with one magnet and two armatures ; (*c*) motor-generators with one magnet and one armature with two independent windings ; (*d*) rotary converters ; (*e*) cascade converters, *i.e.*, an induction motor and a continuous-current generator, interconnected electrically, as well as mechanically ; (*f*) revolving field alternators ; (*g*) rectifiers ; (*h*) frequency changers ; (*i*) phase-shifters ; and (*k*) auto-converters, having split poles, or two pole-pieces to each pole of the armature winding, which latter machines are the most recent type of converting machine, and are used (1) as step-down continuous-current converters ; (2) as voltage regulators ; (3) to convert from variable current at constant voltage to constant current within a limited range ; and (4) as rotary converters affording regulation of the continuous voltage without affecting the power-factor on the alternating side. This paper confines itself to a description of the machines in each class.

On the same day, in the absence of Mr. Hallo, his paper on "Cascade Converters" was read by Dr. Feldmann. In this paper, after comparing the most important qualities of cascade converters with those of motor-generators and rotary converters, the conclusion is come to that, while the efficiency of cascade converters and single-armature converters is practically the same, the first named are more suited for auxiliary poles than the latter, and do not present the same difficulties of commutation, when regulation of voltage is effected on the continuous-current side.

In the same Section, on September 15th, Monsieur Legonez (Paris) read his paper on "Polyphase Motors with Collectors," with special reference to Latour's patent, introducing a subsidiary transformer for phase regulation.

A paper by Signor Sarli dealt with variable-speed three-phase motors, with special reference to the driving of rolling mills and paper making ; after describing the various ways of dealing with loads involving the problems presented by this class of machinery, the author concludes that three-phase motors with collectors are suited for small powers, while large outputs, such as rolling mills, necessitate the employment of the cascade system. In the most recent arrangement this consists of a principal motor driving a variable-speed machine, which returns the energy either in the form of mechanical energy on the shaft of the principal motor, or electrical energy to the supply.

M. Boucherot's paper, read on September 12th, in Section I, introduced a gratifying discussion. It was headed "Electromagnetic Phenomena Resulting from the Sudden Short-Circuit of an Alternator." This paper was specially directed to the difficulties incidental to the construction and insulation of turbo-alternators, and contained numerous formulæ for ascertaining the currents and electro-motive forces to be dealt with.

In Section II, on the first day (September 11th), Mr. Torchio, chief electrical engineer to the New York Edison Co., read his paper on "The Selection of the Transmission and Distributing Voltage, and the Design of Switchboards and Sub-Stations in Large Electric Installations, Taking into Account both Economy in First Cost and Continuity of Service." This paper has some very clearly set-out tables of costs, and appears, on the whole, to favour extra-high-tension transmission. There are also a number of illustrations of E.H.T. arrangements and appliances, and excellently classified particulars of working of various E.H.T. transmission lines in the United States. For high altitudes, says the author, corona effect will limit the voltage to about 100,000 volts ; but, for more favourable conditions, 140,000-volt transmissions are being put into operation.

In the same Section (II) on the 11th, M. Grosselin read his contribution on the problem of underground cables connected to aerial transmission lines. He noted that whereas 60,000 volts on the Continent and 110,000 volts in the United States were employed on transmission lines, cables were not, so far, in use at a greater pressure than 40,000 volts alternating, or 50,000 continuous. The Compagnie Lorraine d'Electricité, however, would shortly have one of 65,000 volts in operation. The question resolved itself into one of testing. In France and England test presssures were as high as two to three times the working pressure. The paper concluded with some notes on precautions against atmospheric discharge, and the change of impedance at the point of junction between the aerial and subterranean cables.

Other representative papers in this Section down for the same day, but apparently not read, were M. E. Ragonot's on "Automatic Cut-outs" (a comprehensive description with moral relating to extinction of the arc in oil) and Mr. Hayes's "Commercial Electrical Apparatus for 100,000 volts Service," a description of E.H.T. fittings, with some useful comments and interesting figures. We note that one branch of the transmission line from Niagara Falls extends to 304·45 miles. On this line 100,000 volts is employed. For voltages of 100,000 and above, the author considers the usual petticoat type of insulator mounted on a pin, and provided with a blade type disconnecting switch, as unsatisfactory for mechanical reasons.

Contributed to the same Section (II) was Herr E. Huber-Stockar's paper on aluminium conductors. This is a careful consideration of the advantages of aluminium over copper, the principal one being in cost. The author concludes that the simultaneous use of aluminium and copper conductors in one installation does not involve a lack of homogeneity prejudicial to working ; that the use of aluminium conductors admits of considerable economy, except in house-wiring ; that aluminium is not economical for small wires (telephone and telegraph), or applicable for bare conductors in conduits, owing to chemical action.

M. J. L. Routin's paper on "Governing on Electrical Generating Sets" works out in favour of an auxiliary motor in combination with a special arrangement of solenoids.

M. Etienne de Fodor contributed a paper on "Refuse Destructors Combined with Electric Generating Stations." He noted that comparative tables of results obtained were difficult to obtain, owing to the use of coal and refuse-fired boilers simultaneously. England and her Colonies have adopted this combination to a much greater extent than other countries. The question is, of course, further complicated by the consideration that the disposal of rubbish must, to a great extent, be unremunerative work.

In Section III, on the first day, SS. Barbagelata and Emanueli presented their paper on "Measurements of Precision" involving the opposition of alternating currents, a comprehensive *résumé* of the instruments belonging to this class, with remarks upon their accuracy.

Prof. Dina followed with his "Measurement of Insulation Resistance of Alternating-Current Installations." The author's method is to interpose two voltmeters between the poles of the circuit and earth and estimate the results by geometrical figures. The paper goes into the question of type of voltmeters, capacity, and the application of the system to single-phase and three-phase current. This paper was not discussed, and was followed by that of Prof. Riccardo Arno on "Volt-Ampere-meters" and their use with wattmeters to ascertain power factor and apparent watts, both on lighting and power circuits. There was no discussion.

On September 12th Mr. A. E. Kennelly read his paper on the "Rotating Electric-Current Field," an investigation based on Galileo Ferrari's experiment of 1889.

Prof. Vladimir Karapetoff's "Some Practical Calculations of Electro-Static Fields, with reference to the avoidance of Corona in H.T. Transmission Work," was read by

Vice-President Dina, and was followed (September 13th) by Dr. Sharp's paper on "Electricity Meters." This goes into the question of watt meters with respect to accuracy, and has some mention of demand indicators. The vexed question of commercial accuracy is touched upon, and various precautionary measures are noted. M. A. Durand read a paper on the same subject. Some interesting comparative tables are given, from which it appears that, in Europe, England and France have the most accurate meters. Various causes of inaccuracy are treated of, and it is a thoroughly practical paper.

On September 15th M. Faccioli gave a *résumé* of Dr. Steinmetz's paper, "The Nature of Transients in Electrical Engineering." By "transients" the author indicates the temporary phenomena which manifest themselves during the change of conditions in a circuit when the magnetic energy and the dielectric energy vary in adapting themselves to the new conditions of the circuit. Equations and rules are given for the determination of the extent of these surges, with a view to safe-guarding against their effect. This paper was well received and discussed.

On the same day Sr. Guglielmo Neuhaus read his paper on "Safety Relays," describing an apparatus for cutting off a broken conductor from the supply, at the network end, as well as at the station end. This depends on an electro-magnet, energised from the line, holding up a weighted lever which drops when the circuit is interrupted.

Another paper in this Section (III), which time did not permit of reading, was Mr. G. Faccioli's "High-Tension Switching Phenomena." This is a valuable and practical paper describing experiments made on an American high-tension transmission line (Shoshone-Boulder of the Central Colorado Power Co. at 95,000 volts, 60 cycles) with a number of oscillograms taken on the L.T. side of the transformers, illustrating the effects produced. On the H.T. side choke coils and spark-gaps were used to estimate the extreme values of the E.M.F. waves.

Mr. E. E. F. Creighton's paper on "Circuit-Protecting Apparatus in America," gives a clear account of a variety of appliances for the protection of electrical conductors from lightning effect and internal waves and surges, breakage, &c.

Another paper on "Prevention of Effects of Internal Surges due to the Action of Interrupters," was that by Sr. Alberto Dina, in the same Section. The author describes a method depending on the insertion of a resistance.

Mr. C. O. Mailloux's paper on "A Method of Determining a Constant Current Producing the same Heating Effect as a Variable Current," is a description of a development of the graphical method of Dr. Fleming.

(*To be continued.*)

LEGAL.

Automatic Telephone Patent.—Petition for Extension.

On Friday last, Mr. Justice Parker had before him in the Chancery Division of the High Court an application in the matter of a petition to extend the term of a patent granted to one Thompson, in 1898, for automatic telephones.

Mr. T. Terrell, K.C., who, with Mr. Courtney Terrell, represented the petitioners, the Automatic Electric Co., said that he was instructed to ask for leave to amend the petition. He brought the matter before the Vacation Court on September 27th, when Mr. Justice Lush extended the time for the delivery of the petitioners' documents, fixed to be delivered at a certain date, but the application for liberty to amend, he directed, should be made to the judge who would hear the petition.

Opposition to the amendment was raised by the Western Electric Co., who were represented by Mr. Astbury, K.C., and Mr. Gray; Messrs. Siemens Bros., for whom Mr. Walter, K.C., appeared; and another electrical company, which was represented by Mr. Gray alone. The petitioners were an American company, and the information for lodging the petition was sent over from Chicago. The lawyers in Chicago did not seem to have known the requirements of the English Courts with regard to petitions for extension of time, and it was now thought necessary to amend by giving particulars of the devolution of title, and by stating the interest in dealings with certain foreign patents facts that had been omitted from the original petition. There were undoubtedly certain imperfections in the way the petition was originally drafted, and which were discovered after investigations by junior counsel, who had gone over to Chicago during the vacation for the purpose of investigating the documents over there. The nature of the proposed amendments were not, counsel submitted, such as would prejudice his opponents, as they were simply in the nature of further and better particulars of matters already stated in the petition. The petitioners owned a large number of patents, but the petition only related to a "calling" device. The opponents asked for particulars, alleging that the terms of certain agreements were not disclosed, and by the amendments what the petitioners proposed to do was to set out those agreements which related to the title and dealings with the foreign patents.

Mr. Astbury, on behalf of the Western Electric Co., said their view was that this was not a *bona fide* petition. They thought that large remuneration and profits were made by the petitioning company owing to this patent having been licensed first by one company and then by another.

Mr. Justice Parker suggested that leave should be given to amend, reserving all questions of costs and without prejudice to the respondents at the hearing raising the question of *bona fides*.

Mr. Astbury had no objection so long as his Lordship reserved to himself the power to refuse the petition on the ground that the only reason set out in the original petition for the extension of time was bad. He suggested, however, that the question of whether or not amendments should be made, should be reserved until the hearing.

His Lordship thought it was only fair that all questions should be left open, as the respondents had raised the question of *bona fides*.

Mr. Astbury said their view was that the petitioners had not disclosed the large profits that had been made by the selling and working of foreign patents.

Mr. Terrell said that, of course, when the petition was framed they did not know the real facts. It was now that they knew them, and they desired to amend so as to put them fully before the Court.

Mr. Astbury said the petition stated that certain documents were in existence; now the nature of these documents had become known, the petitioners desired to amend to get over certain objections. He submitted it was now the respondents' time to say that the petitioners had not proved their good faith.

Mr. Walter took the same view as Mr. Astbury.

His Lordship said that he would allow the petitioners to amend as asked, reserving all questions of costs, and the amendments were to be without prejudice to any objection that might be raised at the hearing on the ground that the petition was not so framed as to allow of the amendments in question being made.

Workmen's Compensation Act: Lift Accident Claim.

An exceptional case under the Workmen's Compensation Act was decided in the City of London Court on Monday, before his Honour Judge Lumley Smith, K.C., in which Elizabeth Russell, 10, Medina Road, Finsbury Park, the widow of an unestablished electrical mechanic lately employed in the Telegraph Department of the General Post Office, claimed £300 against the Postmaster-General for damages for the death of her husband, who was crushed to death in an accident in connection with one of the lifts in the new Post Office buildings. Mr. Morle, instructed by Messrs. Champion, Smith & Co., appeared for the applicant, and Mr. H. E. Gallaher, from the Solicitors' Department of the General Post Office, represented the Postmaster-General. It seemed that Russell was employed to put right some defect on one of the lift bells, and that on March 22nd one of the charwomen told him she had dropped a lavatory key. She asked him to look for it, and he did so, stepping inside the well of the lift, where the key had gone. There he was crushed to death by the down-coming lift weights; hence his widow's claim.

Francis Pickett, the lift attendant, said he brought the lift down in answer to a ring of the bell. Before the accident he spoke to Russell about the lost key, and he never thought he would get inside the well enclosure to look for it. Even he (as the liftman) had never done so during the five years he had been the liftman. A key had never been lost before in the well enclosure, and it was really nobody's duty to get it out. One of the instructions to liftmen was:—"Liftmen are not allowed to get on top or underneath a lift or allow any person to work on top or underneath while the lift is working." He allowed the deceased to have the key leading to the enclosure because he was an experienced man, but he never thought he would get inside.

For the defence, James Fraser, one of the engineers at the Central Telegraph Office, said that the deceased had no business to get in the enclosure of the well space. Only on rare occasions would he go there in the course of his work. The lift was under the control of H.M. Office of Works.

Judge Lumley Smith, K.C.: Would it be necessary for someone to go to H.M. Office of Works before this key could be got out? It must be somebody's duty to get it out.

Witness said that the chief liftman should have been spoken to, and the lift stopped by the Office of Works men. It was not Russell's duty to look for the lost key.

Mr. Gallaher urged that the plaintiff could not recover because the deceased was not acting within the scope of his employment in looking for the key, and cited many cases in support of his submission. Russell's voluntary act of good nature had caused his death. The Postmaster-General had felt very great sympathy for the widow, and he had granted her £25 from a special fund.

Mr. Morle said the Post Office had behaved extremely well towards the widow, who had been taken into the service.

Judge Lumley Smith said in his view the case was rather on

the line amongst all those which had been cited, but, on the whole, he thought plaintiff was entitled to recover the £300 claimed. It was in the interests of the employer that someone should pick up the lost key, and it was nobody's duty to do it. The case came within the scope of the Act. The Court of Appeal might upset it. Judgment for the plaintiff with costs.

Mr. Gallaher asked for a stay of execution, as the Postmaster-General would have to consult the law officers with a view to appealing. They paid the £25 on the assumption that they were not liable for anything. But they would not ask to have that taken off the £300.

The Judge was sure the Post Office would do what was right.

Tramway Accident Claim.

Sheriff Armour Hannay heard evidence at Cupar in an action by a Methil butcher against the Wemyss and District Tramway Co., Ltd., for £300 in respect of personal injuries and damage to a horse and van, as the result of a collision. The pursuer alleged that the tramway line at the point where the accident took place was in such a state that he could not get off the line, consequent on the wheels of his van skidding, the rails being higher than the roadway, and that the car which ran him down was driven carelessly, and at an excessive rate. The company denied the allegations, and contended that the rails were in perfect order. The hearing was adjourned.

G. Straus & Co., Ltd., *v.* S. G. Cozens.

In the City of London Court on Friday, before his Honour Judge Lumley Smith, K.C., a claim was made by plaintiffs, of 211, Upper Thames Street, against defendant, of 63, Queen Victoria Street, to recover the sum of £3 14s. 1d. balance of account for electric cable supplied.

Mr. H. Strouts, plaintiffs' solicitor, said the dispute had arisen in consequence of a mistake on the part of the plaintiffs' traveller.

Mr. Good, defendant's solicitor, said the plaintiffs had made a mistake, and they must suffer by it.

Mr. Henry J. Wright, plaintiffs' traveller, stated that on May 9th he called on the defendant, having been asked to give a quotation for some 37/16 electric cable. He quoted for the cable the price of £131 12s. per mile, instead of which it should have been £231 12s. per mile. The order was given later in the day, and the goods dispatched. A corrected invoice was sent to the defendant the same day, showing the error which had been made. He knew that the defendant was in urgent need of the cable, and that it fluctuated according to the movements on the Rubber Market. He did not think there had been many fluctuations during the past year.

Mr. Good: The boom was on at the time in rubber. Is the price of that cable now only £150?—The witness said it was not.

Mr. Good stated that the defendant bought 65 yards of the cable and the plaintiffs claimed £8 11s. 7d. It should have been £4 17s. 6d. at the £131 12s. rate. Defendant had sent a cheque for the smaller sum and now objected to the plaintiffs seeking to take advantage of the error.

One of the plaintiffs' clerks said they wrote to the defendant and explained to him that the £231 charge was a reasonable price.

Defendant said they had agreed to sell at a certain price and they were bound by it.

The Judge: I think so too. You cannot quote a price and then say you meant to charge a good deal more, unless the thing is absurd on the face of it. Defendant's manager said they carried on a very large business, and they fixed the cable as soon as they got it. The judge said the plaintiffs must stand by their own blunders, and judgment must be given for the defendant with costs. If a man agreed to sell a thing for £1 he could not afterwards charge £3 for it.

Electric Lamp Thefts.

At the Central Criminal Court on Friday, before the Recorder (Sir Forrest Fulton, K.C.), James William Waite and Thomas Powell, surrendered to their bail and pleaded guilty to a charge of stealing a number of metal-filament lamps, the property of Messrs. Siemens Bros. Dynamo Works, Ltd. The defendants were also charged with conspiring together to defraud the prosecutors of their goods. Mr. R. D. Muir and Mr. Adrian Clark appeared for the prosecution; Waite was defended by Mr. Curtis Bennett, and Powell by Mr. Purcell. For the prosecution, Mr. Muir stated that Messrs. Siemens Bros. had a depôt at 39, Upper Thames Street, E.C., where the defendant Waite was employed as a counterman at 32s. 6d. a week. The defendant Powell was a dealer in electrical fittings, and an electrical engineer, and had been a customer of the prosecutors, from whom he purchased lamps and other electrical appliances. The allegation of the prosecution was that Waite, having control of a stock of tantalum lamps, under colour of exchanging defective lamps with Powell, handed him over new and valuable lamps, and covered up the deficiency which would thus have arisen, by means of false entries. In his books the defendant Waite made it appear that defective lamps had been exchanged for Messrs. A. How & Co., of High Street, Leytonstone, and Messrs. Defries & Co., Ltd., of Houndsditch. As a matter of fact, no such transactions took place. Last February the prosecutors found that lamps were missing, and a monthly check was instituted. After a few months, however, it was found that some hundreds of lamps were missing from the stock. As a result, a daily check was instituted, but towards the end of August and the beginning of September some lamps were missed. When spoken to on the matter, Waite said that he gave the lamps to Powell in order to do him a good turn, and booked them out to other firms. He also admitted that he had given Powell new lamps in exchange for burnt-out ones. Waite was given into custody, and the same day Powell came to the prosecutors' premises. He was then told of the statements made by Waite, and denied them. At that time Powell was carrying some lamps which he wanted exchanged, and most of them were burnt out.

The Recorder sentenced Powell to nine months' imprisonment, and postponed sentence on Waite until the next sessions.

OUR LEGAL QUERY COLUMN.

[*Questions addressed to this column should be written on one side of the paper only.*]

"Bakefern" writes: "I should be greatly obliged if you would let me know through your legal column (1) whether purchasers can be called upon to prove damages sustained by late delivery before the contractors are compelled to pay same. I believe it has been laid down that a penalty cannot be enforced, and I cannot myself see the difference between paying a penalty and paying a sum of money and calling it damages when no damage has been suffered. In a recent contract where I looked like being a little behind, I mentioned to the purchaser that perhaps he would not be ready, and he said it did not matter whether he was or not, I should have to pay the damages if I were late. Further, (2) could damages be claimed for withdrawing a tender without its being proved that any damage had been suffered? Suppose, for instance, what had been offered was not what was specified, and the price was higher than that from other people who were offering the correct thing, clearly no damage would have been inflicted on the prospective purchaser, and, under these circumstances, could he make the contractor pay? In speaking of damages for withdrawing a tender, of course I mean where the conditions of tendering specify that damages shall be paid for doing so."

*** A certain vagueness of expression makes it difficult to answer these queries. The first question appears to resolve itself into this: Suppose A is under contract to deliver goods to B by a certain time, subject to penalties for delay. A orders the goods from C, putting C under contract to deliver in time. C makes default, by reason of which B does not get the goods in time. Although B makes no claim against A, can A still claim against C? The answer is in the negative. A penalty will only be enforced in a case where damages are incapable of estimation; and on the facts stated by "Bakefern" the party who employed the contractor is apparently willing to waive the question of damages. But if he enforces, or may hereafter enforce his claim for damages, then A might be entitled to an indemnity.

With regard to the second question, it is clear that a tender cannot be withdrawn after acceptance without risk of there being a claim for damages. As a general rule it would be the duty of the person inviting tenders to minimise the damage by obtaining another tender. The measure of damage would then be the difference between the two tenders. In the case suggested it is conceived that there would really be no contract and no valid tender, because to supply "barley" when "wheat" is asked for is no fulfilment of a contract. The parties would not be (as the lawyers say) *ad idem*.

Free Wiring of Small Dwellings.—The question of the lighting of small dwellings or flats recently formed the subject of a lecture by Mr. E. Wickander at the Royal Machine Construction School at Cologne. The author stated that many supply authorities, recognising that numerous tenants are unable to incur the expense of wiring, have themselves undertaken to defray part or the whole of the cost for the purpose of securing additional revenue, this being particularly the case with companies. As instances of the practice are cited the electricity works at Strassburg, Gotha, the Westphalian Co. of Hagen, Treves, Munich, Genoa, Christiania and Gothenburg. At Strassburg the installations have been carried out, free of charge, to the tenants, and 6,200 dwellings have been wired in 1½ years, these yielding an additional income of at least £3,100 per annum. The system in force at the Gothenburg city works consists in the supply of current for one year free of charge. It was introduced in 1909, and although the city only has a population of 165,000 persons, there are now 8,000 consumers, or as many as in towns with three times the population. The principle adopted at Gothenburg is for the tenant to defray the cost of wiring, whilst the supply works furnish current free up to the amount of the cost of installation, but not for any longer period than one year. The results, however, are not so satisfactory as when the supply authority pays the expenses.

A VISIT TO VERITYS.

There is a tendency among us to regard the aggressive new-comer as being in a more fortunate position than the man who, having been on the ground many years, is hedged around by custom and tradition. True, he may be free of certain handicaps that are sometimes met with where old firms have adhered slavishly to old ways, and buoyancy of spirit, modern equipment, and freedom for enterprise may to some extent serve where experience, connection, and reputation are assets as yet unobtained. Most of us occasionally meet with those who appear to look upon the term "old" as a synonym of "fossilised," and the expression often so glibly used as the result of observation of one isolated incident concerning which we know but half, has, in nine cases out of ten, no truth in it at all. We have in the engineering world to-day many fine old businesses which were established by individuals who lived the strenuous life—even in the "good old times"—when they were putting in the foundations of a great undertaking. They have become known in every quarter of the globe, and their names are household words among us at home still. Wherein are they the worse for age? The pioneers who established them are no more, and the responsibility has fallen upon their descendants, or they have become limited liability companies. Herein we may have strength or weakness according to the circumstances. When principals no longer display a business zeal and affairs are allowed to drift into incompetent and less interested hands, or where sons devote their attention more to the turf or to the hounds than to the business which gave them their social position, small wonder is it if once proud names become among quondam industrial compeers a by-word and a reproach. The business may live a lingering sort of death held together by its old connections, and then there comes the inevitable reduction of capital, the reconstruction and reorganisation, and new blood is brought in to endeavour to rehabilitate the concern, but a good business name once lost is hard to recover. This work of rehabilitation is a thankless, and often a hopeless sort of task, and well-known names are doomed to disappear—we recall some whose fate this has been after a hundred years' existence; the attempt to rouse oneself and get into the modern run of things, building new works and so forth, has been made too late.

Messrs. Veritys' New Showrooms:
A View of the Eighteenth Century Room as seen from the Oak Room.

But this is only part of the story, and there is not the same need to dwell upon it now as was once the case, for there are many masters' sons in business to-day who are every whit as live and enterprising as their fathers were, as well as being more scientifically trained and commercially educated. The imperative necessity for modernisation in old factories has been fairly generally recognised, and some of these to-day are running efficiently and economically with the added advantage of a world-wide reputation which naturally has taken years to secure.

There is something interesting and attractive about the restless activities, and abundant life and energy, as well as the plain and hopeful speech, of the new-comer who, admitting that things are not what they were and that fortunes are not now so easily made, desires to get together a business, make money, and incidentally leave a name to industrial posterity. But while this is all exactly as it should be, the onlooker, if he be a man who has sufficiently studied the business game, will not be so absorbed in the contemplation of youth that he cannot feel an even greater satisfaction as he surveys an old-time business catching on year by year the new spirit and adapting itself to new situations as they arise. We venerate the old, but the combination of accumulated experience of industry and trade, knowledge of men and their idiosyncracies and the exercise of diplomacy in dealing with them, and a connection which is so firmly rooted at home and abroad that all the assaults of a twentieth century competition make no impression upon it, only add admiration to our veneration. We recognise that in these times it is fatal to depend too much upon an honoured name, but we confess to the pleasure that it has sometimes given us when conversing with employés of firms of long standing and renown to hear them speak with glowing pride about "our good old name," "our world-wide reputation," immediately proceeding to enter into details of modern enterprise and activity, demonstrating that though time has brought great change it has not brought decay. It may be that the reader will wonder to what all this cogitation is leading him. As a matter of fact, we have been led to make these casual reflections by recalling old names and firms to mind, contemplating their present doings and looking backward at what we have seen of rise and fall in a not more than ordinarily lengthy experience of the electrical and engineering industry. The incident which must be blamed for this indulgence in the reflective mood was conversation and observation in some premises a little off the Strand where an old print of the building as it was, say, 80 or 90 years ago, appealed to our literary instincts because of wielders of the pen whose haunts were thereabouts when journalism and literature were more attractive, because less commercial than now. To fall from the sublimer sphere to the matter of fact, let us say that the premises were those in King Street bearing the name of Verity. The aforesaid print shows the old original "Verity" shop where the gas fittings business

had its birth, now close upon 90 years ago. But there is not much of the old building remaining to-day. Contiguous premises were absorbed by the voracious Verity of former days as business requirements compelled, so that the frontage is wider now, and inside the building during the last few months there has been a complete turning upside down and inside out, and the old rooms redolent of memory have had to give way before the pressing commercial necessities of 1911.

Veritys' New Electric Heating and Cooking Showrooms.

In many of its departments the electrical industry generally shows signs of increasing business, and a visit to these West End premises with their accommodation for counter trade, their special department laid out to educate the public itself up to the virtue of electric heating and cooking, and their admirably-appointed periodised show-rooms, all indicate that Messrs. Veritys are enjoying a good share of the improvement.

We have said repeatedly that electrical firms who in these days adopt a really enlightened foreign trade policy are bound to be rewarded, and if we were to refer merely to this particular aspect of Veritys' business, we should have to feel that it was the adoption of an aggressive foreign policy which had led to the necessity for both the large outlay at the Covent Garden premises and for the extensions to the Aston Works, which we illustrate in one of the accompanying photographs. The chairman of the company is a widely-travelled man, and in recent years he has conducted a personal investigation of electrical affairs in Canada, in India, in Russia, and we know not where—we are not sure whether he has been so far as the Antipodes. It is an instance of the success following the going out of the right man, armed with his own full authority and freedom to negotiate, and possessed with credentials giving him an *entrée* into useful circles. How far peregrinations of this kind have been responsible for a recent signal success in Ceylon against very keen Continental and American competition, we are not able to say, but the fact remains that the firm has just booked for Ceylon a contract to the value of £10,000 for electric fans, fittings, motors and other material.

Close upon 30 years ago an advertisement appeared in the Telegraphic Journal and Electrical Review, as we then called ourselves, to the effect that B. Verity & Sons, King Street, Covent Garden (only address), were designers and manufacturers of electric light fittings, that their showrooms were lighted by the Edison incandescent electric light, and that at the 1882 Crystal Palace International Electric

The Latest Addition to the Works at Aston.

Exhibition they were awarded the only prize medal for electroliers and other appointments for incandescent electric lighting. The firm of that day devoted itself to a speciality—electrical illumination; but the great strides that have been made by the electrical industry have led to other departments being opened and extended as occasion demanded, dealing with motors up to 100 H.P., electrical ventilation, controller gear, arc lamps, and last, but not least, electrical heating and cooking. Their three-volume catalogue shows how wide a field they cover, and is itself widely used both at home and abroad.

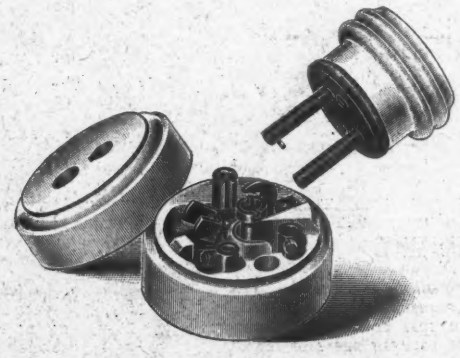
We gave a fully-illustrated description of the Aston Works, showing the manufacture of motors, switches, arc lamps, fittings, switchboards, &c., in our issues of March 2nd and 9th, 1906. It is interesting to note that this year the firm celebrates the 21st year of its removal of manufacturing operations from London to Birmingham. Since that change took place the progress made in electric heating and cooking, electric signs, electric fans, electric motor applications and other such lines has made new demands upon manufacturing capacity. In one of our photographs we show a collection of the heating and cooking apparatus that is now on show at Covent Garden. To a large extent pictures of this kind must be allowed to speak for themselves.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

Automatic Switch-Plug.

Messrs. Julius Sax & Co., Ltd., of 24A, High Street, New Oxford Street, W.C., have just introduced a combined switch-plug which offers a ready means of complying with the regulations requiring plug connections to be independently switch controlled on the live side of the connector.

It will be seen from our view, that the arrangement consists of a china base with cover, containing a quick-break switch, the movement of which is controlled by a small pin projecting sideways from the tip of one of the plugs; the inserting of the plugs in the sockets pushes the switch "on," while on withdrawing the



plug, the small pin referred to catches in a hooked projection on the switch arm and pulls it off at the same time—a spring movement giving a quick-break. With this arrangement it is obviously impossible to insert the plug into "live" terminals as the switching-on action does not occur until the plug is pushed home; similarly the sockets are "dead" before the plug can be withdrawn. The device is well-made and is as easily wired as an ordinary plug.

Foster Contactless Electric Bell.

Having marketed a small transformer for ringing electric bells from the public A.C. supply, the Foster Engineering Co., Ltd., of Wimbledon, have gone one better, in devising an alternating-current electric bell without a make-and-break. The mechanism is similar to that of the ordinary trembler bell, with the difference above-mentioned; the armature, however, is stiffly supported, so as to have a natural period corresponding with that of the supply current, and carries a clapper on a flexible stem, the result being that the bell is caused to ring by the alternations of the current. The bell may be operated in series with a lamp, or off a transformer, or may be wound for direct connection to the lighting circuit. It is an ingenious device, and should prove popular.

BUSINESS NOTES.

The Mazda Lamp.—A new and attractive showcard has just been issued by the British Thomson-Houston Co., Ltd., with the intention of giving fresh impetus to the demand for the "Mazda" lamp, with drawn-wire filament, the mechanical strength of which is graphically demonstrated by the centre

illustration. A brawny arm with clenched hand is seen striking a "Mazda" lamp. The force of the blow sets the lamp swinging in mid-air—with the filament intact. Other features of the new showcard are several well displayed catch-words. We understand that the black and white reproduction herewith gives no idea of the actual effect as the circle in the centre is a vivid red.

Catalogues and Lists.—Messrs. Gent & Co., Ltd., Faraday Works, Leicester.—56-page catalogue (No. 8) containing brief descriptions, numerous illustrations, and particulars of prices, of a variety of colliery accessories, including standard pattern magneto call telephones, portable and watertight telephones, switches, relays, mine exploders, miners' lamps, weatherproof bells and pushes, batteries, wires, insulators, lamps, carbons, cluster fittings, watertight lighting fittings, ironclad switches and fuse-boards, steel conduit, &c.

Messrs. Falk, Stadelmann & Co., Ltd., 83-87, Farringdon Road, London, E.C.—List No. 328, of 32 pages, illustrating various designs of "Aureola" luminous radiators and convectors ranging from the simple two-lamp iron-frame radiator to the antique copper and polished brass frame radiator of more ornate character. Among the latter we observe one with gilt brass frame, with cast enrichment and brass curtain. A novelty—as it strikes us—is a radiator in wrought-iron frame, double encased, with polished copper reflector, with a fire-screen giving the effect of a coal fire.

Messrs. Siemens Bros. Dynamo Works, Ltd., Tyssen Street, Street, Dalston, N.E.—The firm announce a new departure in connection with the pushing of their "Onewatt" battery lamps. They are now supplying showcards which can be purchased by contractors in quantities, and on which one of each type of "Onewatt" battery lamp is mounted. These are, of course, supplied to contractors at prices embodying the discount allowed to the trade. The card is printed in red and blue, and is mounted on stiff board, which is cut away in order to effect a secure fastening for the lamps, and is eyeletted and strung for suspension purposes. On the back of the showcard are printed full particulars of the types of lamps which can be obtained, together with the voltages and candle powers in which they are supplied. The various types of lamp and prices are clearly shown, and contractors may find the cards to be business-bringers if suitably displayed in their windows

We have received a framed reproduction of a series of interesting sketches by Mr. McBean on "Making the 'Onewatt' Lamp." They depict the processes entirely from the humorous point of view, and in the main are quite successful in getting home on the points claimed in favour of the lamps.

Messrs. Hans Renold, Ltd., Progress Works, Brook Street, Manchester.—New illustrated pamphlet of eight pages relating to Renold driving chains applied to governors and valve gear. Copies can be obtained on application.

The Knapp Electric and Novelty Co., 511, West Fifty-first Street, New York.—Catalogue No. 22 containing illustrated particulars and prices of a number of miniature models of electric motors, dynamos, battery fans, magnetos, electric trains, &c.

The Metallic Seamless Tube Co., Ltd., Wiggin Street, Birmingham.—New catalogue of 30 pages (No. F3) containing excellently printed illustrations and prices of many designs of electric light fittings (electroliers, cord pendants, rise-and-fall pendants, ceiling fittings, wall brackets, standards and hall lanterns). A number of hand-wrought luminous radiators and cast-iron watertight fittings are also included.

Book Notices.—"The Mathematical Theory of Electricity and Magnetism." By J. H. Jeans. 1911. Cambridge: The University Press. Price 15s. net.

"Electric Traction for Railway Trains." By Edward P. Burch. 1911. London: Hill Publishing Co. Price 21s. net.

"*Boletin* de Ingenieros." Vol. II, No. 1. September, 1911. Mexico: Secretaria de Guerray y Marina.

"Il Nuovo Cimento." September, 1911. Pisa: Stabilimento Tipo, Toscano.

"Memoirs of the College of Science and Engineering, Kyoto Imperial University." Vol. III, Nos. 4, 5 and 6. Kyoto, Japan: The College.

"The Post Office Electrical Engineers' Journal." Vol. 4, Part 3. October, 1911. London: H. Alabaster, Gatehouse & Co. Price 1s. net.

"The Steam Turbine: The Rede Lecture, 1911." By Sir Chas. A. Parsons, K.C.B. 1911. London: Cambridge University Press. Price 1s. 6d. net.

"The Physical Review." Vol. XXXIV, No. 3. September, 1911. Lancaster, Pa.: The *Review* Offices.

"*Journal* of the American Society of Mechanical Engineers." Vol. XXXIII, No. 10. October, 1911. Baltimore, Md.: The Society. Price 35 cents.

"The Law Relating to Engineering." By L. W. J. Costello. 1911. London: The Society of Engineers. Price 5s.

"An Elementary Course on Applied Electricity and Magnetism." By Daniel H. Ogley. London: Longmans, Green & Co. 1911. Price 2s. 6d. net.

Trade Announcements.—For the convenience of their customers throughout Scotland, the Western Electric Co., Ltd., have opened a branch office in Glasgow at 49, West Campbell Street, where their representative, Mr. Malcolm Breingan (late of the General Electric Co.), will give personal attention to all inquiries for cables, telephones, and electrical supplies. Demands will be met from stock. Telegraphic address, "Microphone, Glasgow"; telephone, No. 1999 Central.

In consequence of the re-numbering of Tothill Street, the address of Messrs. Ledward & Beckett, Ltd., will in future be 33, Tothill Street, S.W.

Mr. T. Wray has removed his business, as electrical engineer, from Petergate, James Street, to 3, Cheltenham Crescent, Harrogate.

Messrs. Mayne & Sons, electrical engineers, of Station Approach, Beaconsfield (Bucks.), have opened a branch business at 5, Market Street, Maidenhead.

Messrs. Haslam & Schontheil, Ltd., of 11, Windsor Place, Cardiff, have been appointed selling agents in South Wales and Monmouthshire for Messrs. E. Bennis & Co., Ltd., of Little Hulton.

Owing to rapid extension of business the Silent Electric Clock Co., of 192, Goswell Road, E.C., have, for the second time within 12 months, had to enlarge their premises. They have just fitted up additional office accommodation and a new large showroom, where they will welcome visitors who wish to inspect the details of their "G. B. Bowell" silent electric clocks.

Mr. F. Peake Sexton has removed to 48, London Road, Kingston-on-Thames, owing to increased business. The business will be carried on as Tameso Co., electrical contractors and scientific advisers.

The British Thomson-Houston Co., Ltd., are removing their Leeds office from Greek Street Chambers to Standard Buildings, City Square. The telephone number is unchanged, namely, "3244 Central."

Cab Tire Sheathing.—In a letter received too late for our "Correspondence" columns, referring to the mention of cab tire sheathed cable in a letter signed by "An Electrician" in our last issue, Mr. J. H. C. Brooking, manager of the St. Helens Cable and Rubber Co., Ltd., points out that the writer is wrong in stating that this cable, in the kindred forms of hard cord and metallic-braided flexible, has been in use for seven or eight years. There is a considerable difference between cab tire sheathing and the protection of the flexibles mentioned, as in fact there is between this class of cable and any other in use; and while he does not wish to make comparisons with what are really useful types of cables in certain situations, Mr. Brooking desires us to insert this correction to our contributor's statement, lest his company's patent cab tire sheathed cables should be confused with other types of protected cables.

"Twingrip" Lampholder.—We are informed that this lampholder, designed to prevent short-circuiting of the flexible cord where it enters the cord grip, is shown on the stand of the Edison & Swan United Electric Light Co., Ltd., at Olympia.

Bankruptcy Proceedings.—C. F. Lindop, electrician, 16, Moss Lane, Aintree, Liverpool, late 62, Dale Street, Liverpool.—The adjourned public examination took place on Monday last at Liverpool. The Official Receiver said that since the last hearing of the case he had had an opportunity of seeing a number of vouchers for payments which were in the hands of the Receiver for the debenture-holders, and so far as he was concerned, the examination might now be closed. Mr. Garner Smith, for creditors, said he had nothing further to ask. Mr. Madden, barrister, also present for creditors, had nothing to ask. Mr. Gething, barrister for the debtor, asked that the examination be closed, and this was sanctioned by the Registrar.

Metallic-Filament Lamps—Price Reduction.—The interesting announcement has just been made by the General Electric Co., Ltd., makers of the Osram lamp, that the prices of H.V. Osram lamps are now reduced from 3s. 9d. and 4s. respectively to 3s. This reduction, we are informed, is not in any sense indicative of an existing or impending war of prices; it has been made deliberately, with the co-operation of the various other firms which are licensees of the General Electric Co., or with which that company has a patent understanding, because the initial difficulties experienced in the manufacture of high-voltage lamps, with their necessarily delicate filaments and larger bulbs, and the high percentage of breakages in the process, have been to a large extent overcome, and thus the reduction has been made possible by an actual decrease in the cost of production. The lower cost will prove of material assistance to the electrical industry in its fight with the gas mantle, and the makers hope to benefit also by the increased demand resulting therefrom.

Simultaneously we have been notified of corresponding reductions by Messrs. Krupka & Jacoby in the list prices of their Graetzin lamps (200-260 volts, 3s.; 100-135 volts, 2s. 6d.); the Edison and Swan United Electric Light Co., Ltd. (do., do.), who are also introducing 12-watt 100-130-volt and 24-watt 200-260-volt lamps at slightly higher prices: Messrs. Drake & Gorham, Ltd., Osram lamps as above (and a 20-watt 16-C.P. lamp for 200-260 volts); Messrs. G. M. Boddy & Co., Mazda drawn-wire lamps (prices as above); and Messrs. Siemens Bros. Dynamo Works, Ltd., "Onewatt" drawn tungsten lamps (prices as above). The last-named firm inform us also that the H.V. tantalum lamps are reduced to 3s. each (in ordinary bulbs), and that the sale of both these and the tungsten lamps is steadily increasing.

Dissolutions and Liquidations.—Auto-Controller and Switch Co., Simplex Works, Vienna Road, Bermondsey, London, S.E.—The partnership between Walter Robbins Cherry and John Bush has been dissolved. The business of the Auto-Controller and Switch Co., including the manufacture of Fluxite soldering paste, is being carried on by Mr. W. R. Cherry alone, under the old name and at the same address.

Davis Electrical Co., Ltd. (in liquidation).—A meeting of creditors will be held at Armfield's Hotel, South Place, E.C., on October 23rd.

Animatophone Syndicate, Ltd.—A petition for winding up this company, presented by Peto & Radford, Ltd., and E. T. Heron and Co. (publishers), is to be heard on October 24th.

Doncaster Electrical Co., Ltd.—A meeting of creditors was called for October 16th, at Doncaster.

Fire.—The premises of Messrs. Parsons Bros., electrical engineers and ironmongers, 34, Eastgate Street, Gloucester, were, on 1st inst., destroyed by fire.

LIGHTING and POWER NOTES.

Australia.—The North Sydney (N.S.W.) Electric Lighting Bill is to be introduced into the Legislative Council at an early date; the Bill is on the same lines as the Balmain Council's Bill, which gives the Council power to enter into arrangements with a supply company if necessary.

The Perth (W.A.) City Council is endeavouring to secure the services of Mr. H. R. Forbes Mackay (Sydney) to report on the proposed purchase of the Perth Gas Co.; two reports on the matter have already been obtained.

A preliminary report has been received by the Tasmanian Minister of Mines, showing that 5,000 H.P. could be disposed of at North-East Dundas for mining purposes, and that this could be developed with the local water power.

Bampton (Devon).—A largely-attended meeting was recently held to ascertain the feeling of the inhabitants regarding an electric light scheme. Mr. Steele attended on behalf of the consulting engineers, Messrs. J. and W. Purves, and explained the details of a scheme estimated to cost £1,700, divided into ordinary shares of £1 each. It was considered that the present was an opportune time for the introduction of an electric light scheme, seeing that they would not meet with any opposition from a gas company, as in some towns. As there are no gas works in the town, it is predicted that the growth of the undertaking would be rapid and remunerative. The meeting heartily approved of the electric light scheme being introduced, and elected a committee to promote the same.

Bangor.—The City Council has decided to spend £500 upon a further extension of the electricity mains and services, and proposes applying to the L.G.B. for sanction to borrow the money.

Batley.—The T.C. has decided to ascertain the number of probable consumers of current in the Staincliffe boundary district, with the view of extending the mains and feeders there. The estimated cost is £1,700.

Birmingham.—The Electric Supply Committee has decided to acquire a site of 17 acres for another generating station. It is stated that the Committee intends to erect a H.T. power station, with an up-to-date equipment, at a cost estimated at nearly a quarter of a million sterling.

Bradford.—The annual report of the Corporation Electricity Committee, which has just been issued, shows that output and revenue have continued to increase, whilst the working expenses per unit sold show a decrease, and the net profits an increase. The latter, for the financial year ending March 31st last, amounted to £8,979. The total revenue exceeded that of the previous year by over £3,000, this being due, no doubt, to the policy of the Committee in reducing charges, thereby bringing about a greater demand and a larger output. The increased output in connection with the bulk supply during the 12 months ended June 30th, 1911, though not so great as in the year previous, reached the substantial figure of 540,628 units. The output to the smaller power consumers, however, has increased by 527,845 units. The new rateable value system of charging for current supplied to private houses has proved popular, over 40 per cent. of such consumers having now adopted this system. The total number of consumers at the end of June had increased from 2,701 to 3,052, being an increase of 13 per cent. Altogether 351 new consumers had been obtained—the largest yet recorded in one year.

Cheltenham.—The T.C. has authorised application to be made to the B. of T. for an order to amend the Cheltenham Electric Lighting Orders of 1890, 1899 and 1900, by extending the area for the supply of electricity to the parishes of Leckhampton, Swindon, Prestbury, Badgeworth, Shurdington and Up Hatherley, in the Cheltenham Rural District, and to Bishops Cleeve, Southam, Brockhampton and Woodmancote, in the Winchcombe Rural District. It was stated that the undertaking had gradually progressed, and from having only 101 consumers, had now 1,401. The increases in the number during the last two years had been greater than ever before, viz., 147 last year and 153 the year before.

Clevedon.—A company has been formed for the purpose of providing an electricity supply for the town, and shares to the value of over £6,000 have already been taken up.

Continental Notes.—FRANCE.—A new company has lately been formed at Douai (Nord), with a capital of £5,000, and the title La Compagnie Electrique du Canton de Marquion (Pas-de-Calais), to undertake the supply of electrical energy for lighting and power purposes to a number of villages in the Marquion district.

The establishment of generating stations at the mines in the Pas-de-Calais district is on the increase and extending to other Northern mining districts. Those mines using coke furnace gas, or that derived from inferior coal, are able to generate current at a cheap rate and to profitably distribute it, after having appropriated the energy needed for their working, at times when there is the least call for it at the mines. Among the mines which are active in this new departure are the Lens Colliery, which has founded the Société Electrique du Nord; the Béthune Colliery, whose offshoot is the Société Arthésienne d'Eclairage et de Distribution; the Bruay Colliery, which has launched the Société Beithunoise. These electrical societies have come to an understanding as to the sharing of the supply area, and the current which they are about to generate will presently be distributed at 26,000 volts, and afterwards at 45,000 volts throughout the departments of the Pas-de-Calais, the Nord, and as far as those of the Aisne and the Somme. The character of the equipment of the several mines' generating stations is shown by the following details:—That at the Bruay Colliery comprises two turbo-generators, of a capacity of 1,000 KW. at 5,000 volts. The Ligny-les-Aire station has a group of high-pressure Zoelly turbo-generators of 900 KW., distributing current to the transmission lines at a pressure of 5,000 volts. The Lens Colliery has already at work a group of turbo-generators of an average capacity of 5,250 KW. The Courrières Mines has completed the installation of a turbo-alternator of 1,000-KW. capacity. Calculations recently made show that the power available for the working of the mines represents on an average 3,130 H.P. per 1,000 tons extracted, as contrasted with 2,950 H.P. in 1909.

BOSNIA.—The Austrian Finance Ministry has approved of the plans of an electric light and power station at Bihać, and the constructive works will be undertaken forthwith by the firm of Janesch & Schnell, the equipment and starting of the undertaking being entrusted to the A.E.G. Union of Vienna. The cost, estimated at over 300,000 kr., has been advanced to the local authorities by the Agrar und Kommerzial Bank of Sarajevo.

Devizes.—At the last meeting of the T.C. a scheme for extending the area of supply for electric lighting in the neighbourhood was adopted. Starting in 1895 with 101 customers, an average of about 90 a year, it was stated, had been added.

Dundee.—The Convener of the Corporation Police Committee states that great progress is being made in the lighting of common stairs by electricity, and that there are now between 1,500 and 1,600 electric lights in use.

Fleetwood.—The Fleetwood Council is making every endeavour to popularise the use of electric current; it has just opened an electrical exhibition in Lord Street, where there are on view the latest appliances and all manner of electrical fittings.

Frome.—At the meeting of the U.D.C. the General Purposes Committee reported that they had passed plans for extensions of the electricity works. The contractors are Messrs. Edmundson.

Glasgow.—The City Watching and Lighting Committee recommends that 100 electric lamps be obtained for use by the police, and that the electrical engineer be requested to have a switchboard and motor-generator for charging the lamps installed at the Central Police Chambers at a cost of £90. Hitherto oil lamps have been used.

The new electric passenger lifts installed in the Corporation's principal public library, which was recently opened, are of the full automatic push button type, with electro-mechanical gate locks, a range of push buttons in the car, and call pushes at each of the six landings. The lifts have been installed by Messrs. John Bennie, Ltd., Glasgow, who are at present fitting one of their lifts into Windsor Castle.

Gosport.—Independent electrical installations are to be provided by the Government for the Royal Clarence Victualling Yard and the new Magazine Works at Bedenham.

Hartshead.—At the monthly meeting of the Halifax R.D.C., held at Halifax, an agreement was signed between the Council and the Yorkshire Electric Power Co. to supply 50 lamps for lighting the streets of Hartshead with electricity. The work is to be proceeded with as soon as possible.

Japan.—The Municipal Electric Bureau of Tokio has announced a scheme for the installation of a million electric lamps in the Japanese capital. According to the proposal, the work is to be completed within two years, the cost being estimated at £2,000,000.

Liverpool.—During the present year the demand for electrical energy for power purposes has steadily increased in Liverpool, and 305 motors, &c. (equal to about 1,300 H.P.) have been connected to the public supply mains, while the current supplied for this purpose exceeded by more than 30 per cent. the sales of the previous year. There are now about 8,230 consumers connected to the mains. The area of supply has been increased in many districts by extensions of the distributing mains, the whole of the work being carried out by the staff and employés of the department. In this connection, an important feature has been the supply of the garden city estate at Wavertree, where 89 dwelling houses have already been connected, with a prospective total of about 1,800 houses.

It was reported by Mr. H. Gobie (chief engineer) at the meeting of the Workhouse Committee on October 12th, that during the past year the electrical plant of the Brownlow Hill Workhouse had worked so satisfactorily that the total annual cost, including £700 for interest and repayment of loan, had only amounted to £1,698, compared with the sum of £3,291, which would have been charged by the Corporation if the supply had been obtained from the municipal mains at a flat rate of 2½d. per unit. In 1907-8, the cost of generating 316,000 units was £1,075 or ·813d. per unit, and last year the cost was £998 for generating 329,000 units, or ·725d. per unit. In fours years the coal consumption had been reduced by 1 lb. per unit, equal to a saving of 147 tons per year for electric light and power purposes, while in the same period the maintenance cost had advanced only £12.

London.—BETHNAL GREEN.—The Electricity Committee has recommended that Mr. J. F. C. Snell be appointed to advise in regard to the proposed scheme of electricity supply, at an inclusive fee of 200 guineas.

Newport (Mon.).—The T.C. proposes to ask the L.G.B. for sanction to borrow £5,000 in order to provide motors for hire and hire-purchase in the town, and for the purpose of wiring approved premises, and the Electricity Committee has been ordered to take the necessary steps in the matter.

Portsmouth.—The E.L. Committee of the T.C. has decided to extend the cables so as to supply current to Weingarten's factory at All Saints, and to install seven 1,000-C.P. flame arc lamps along the tramway route The lighting mains are also to be extended in the Goldsmith Avenue district, where houses below £30 annual value are now being wired owing to the economy of the metal-filament lamp.

Quarndon.—The Derby T.C. is making efforts to have the electric supply extended to this village by means of overhead wires carried through the fields at the rear of the houses, and, providing no obstacles are put in the way by the P.C., the scheme will go through. The main object is to give a supply to Kedleston Hall, as Lord Scarsdale desires to do away with his private plant. Other influential residents have promised to take current, and it only rests with the P.C. to extend its support, and, if possible, to have the village lit by electricity.

Southampton.—The Electricity Committee of the T.C. has recommended that the price of current for ordinary lighting be reduced from 3½d. to 3d. per unit as from the December readings.

Stoke-on-Trent.—The T.C. has received the sanction of the L.G.B. to practically all the loans asked for in connection with the £60,000 electricity scheme.

Stourport.—The B. of T. has deferred the question of revoking the E.L. order until the end of the year. The Kidderminster E.L. Co., which is the holder of the order, is taking steps to carry it out, the U.D.C. having granted concessions with regard to the use of overhead wires.

Swindon.—For some considerable time extensions have been proceeding at Swindon electricity works, and further plant is now to be installed, the electrical engineer's estimate for which is as follows: One 250-KW. Diesel engine, £8,320; fuel tank, £100; road tank, £50; foundations, £300; piping, &c., £300; switchgear, £200; contingencies, £320—total, £5,600. Some discussion took place at the T.C., relative to the purchase of the Diesel oil engine, some of the members preferring a steam turbine set, but eventually it was decided to install a Diesel set. The electrical engineer's judgment was that, from both engineering and financial standpoints, Diesel oil engines, as distinct from steam turbine engines, were a sound proposition.

Swinton and Pendlebury.—The U.D.C. has instructed the resident engineer to submit a scheme for the supply of electricity in the area bounded by Partington Lane, Worsley Road and Moorside Road, together with an estimate of the capital cost.

Teignmouth.—A special meeting of the Urban Council has been held to consider a letter from Dr. Purves regarding the electric lighting order which he proposes to promote this autumn. Dr. Purves wrote that if the suggestions contained in his letter were approved, the Council would lay the necessary mains and distribute and sell the electricity in Teignmouth, a business that could easily be carried on by the present gas department. The only capital outlay for the Council would be upon the mains, as he would provide all the capital for the generating station and destructor. The letter was discussed in Committee, after which it was resolved that, having carefully considered the matter and being unable to accept Dr. Purves's figures, it declined the offer contained, as even assuming his figures to be correct, the Council considered that the proposed undertaking could not result in anything but a serious loss to the ratepayers of the town. The clerk was instructed to proceed, as agreed upon at the last meeting of the Council.

Wakefield.—The T.C. has received the sanction of the L.G.B. to a loan of £4,500 for mains, £540 for transformers, and £500 for sub-stations.

Wednesbury.—On Wednesday, last week, a L.G.B. inquiry was held respecting an application by the Corporation for sanction to borrow £4,997 for the purposes of the electricity undertaking. Mr. Fennell (borough electrical engineer) stated that the success of the undertaking dated from the time the Corporation ceased to buy its electricity in bulk and put down its own plant. Prior to the putting down of its own plant, he added, it was losing annually a sum equivalent to a rate of 2¼d. in the £.

Whitehaven.—The T.C. has received a letter from the electrical contractors of the town objecting to a form of specification for wiring that was being sent out by the electrical engineer, which, they contend, is an interference with their business. The T.C. has referred the matter to the Water and Lighting Committee for consideration.

TRAMWAY and RAILWAY NOTES.

Australia.—In connection with the report of the Royal Commission favouring the electrification of the Melbourne Suburban Railways, it is further recommended that the State should purchase the rights in the existing metropolitan tramways, and that pending the creation of the proposed Greater Melbourne Council, a municipal tramway trust should be formed to run the tramways. The Greater Melbourne Council, we may add, proposes to incorporate 19 outlying and adjoining municipal areas with Melbourne, for administrative purposes and for the control of the public utility services.

Colwyn Bay.—At the meeting of the U.D.C. on October 10th, the clerk drew attention to the notice given by the Llandudno and Colwyn Bay Tramway Co. of its intention to apply to the B. of T. for an extension by two years of the period during which it may construct the remainder of the "Railway No. 7" at Colwyn Bay. The only portion of No. 7 railway not yet constructed, he explained, was a length of about 24 yards from the present terminus at the top of Station Road in the direction of Old Colwyn. There was another railway, No. 8, authorised, extending further in the direction of Old Colwyn, but the period covered by the B. of T. order in respect of it had not yet expired. It was questionable whether any opposition to the present application would serve a useful purpose. It was decided, as a protest, to ask the B. of T. to grant the extension for one year only.

Continental Notes.—AUSTRIA.—It was mentioned a few weeks ago that the Vienna Traffic Commission proposed to invite offers in connection with the projected conversion of the Vienna City Railway to electric traction. It is now announced that the seven large banks in that city, in association with the local A.E.G.-Union Co. and the Austrian Siemens-Schuckert Works and their German friends, have offered to enter into negotiations with the Traffic Commission in regard to the matter, and it is assumed that the Austrian Brown, Boveri & Co. will also join the group in order to exclude competition between the firms in question. The expenditure on the transformation would be so considerable as to preclude one bank from financing the enterprise, and this explains the co-operation of the seven leading banks in Vienna. On the other hand, a French syndicate, headed by the Omnium Lyonnais, is also taking an interest in the matter, and a firm at Prague is likewise concerned in the question.

A preliminary concession has lately been granted in respect of a projected narrow-gauge electric railway between Orlau and Kapaniny, Austrian Silesia.

GERMANY.—It is stated that as a result of the experience gained this year in the working of the main line on the trial section between Dessau and Bitterfeld, the Prussian State Railway authorities are now proceeding to convert to electric traction the connecting lines between Bitterfeld, Leipzig and Halle, and between Dessau and Magdeburg. A beginning has already been made with the extension of the Muldenstein power station, which is situated in the Bitterfeld lignite district, and from which the railway is supplied with H.T. alternating current. Two steam turbines, each of from 5,000 to 7,500 H.P., have been ordered from a Berlin firm, and it is expected that the total length of 93 miles of railway will be operated by means of electric locomotives in about a year from the present time.

It is reported in well-informed circles in Berlin that as the preliminary labours in connection with the proposed transformation of the Berlin City Railway to electric traction have been completed, the practical work may be expected to be put in hand in the near future. It is proposed to erect a power station in association with a lignite mine in Saxony, the energy being transmitted over the long distance to Berlin.

The narrow-gauge railway running between Bremen and Tarmstedt is to be converted to electric driving. Negotiations for the alteration of the concession are under way, and as the Bremen Senate and the Government President at Stade are in favour of the project, little doubt of its realisation may be entertained. The capital required, about 1,500,000 marks, is said to be available.

RUSSIA.—Good progress is being made with the electrification of the horse tramways in Odessa; the power station and three sub-stations have already been completed, and 16 miles of electric tramways are now open for traffic.

ITALY.—Official sanction has been accorded to the application by the Société Anonyme Les Tramways de Palermo for leave to construct and work a tramway network at Palermo.—*Giornale dei Lavori Pubblici.*

Darlington.—The B. of T. has granted the T.C. an extension of time until October 24th, 1913, for completing the tramway extensions to Haughton.

Dewsbury.—At a joint meeting of the Parliamentary and Electricity and Tramways Committees it was decided, by a small majority, to recommend the Council to apply for a prov. order authorising the construction of a tramway along Willans Road, Moorlands Road and Staincliffe Road, to the Butcher's Arms.

Dundee.—Mr. Peter Fisher, the manager of the Corporation Tramways, has issued an interesting report on the effects of changes in the fares, which were remodelled about six months ago. At that time a general fare of 1d. all the way from the centre of the city to the suburbs was adopted. This involved the cutting down of some of the ½d. stages, and these stages were generally fixed at 880 yds. The estimates for the current year provide for a reduction in the receipts by £2,200, as compared with the previous year's working, but the actual result of the first four months' working under the new conditions showed a drop of only £289, instead of £730, as estimated. That the change of fares was popular with the public was evidenced by the increase in the number of passengers carried, which was 44,608 greater than the number for the same period of last year. Comparatively few tramway systems, Mr. Fisher states, had adopted ½d. fares over the whole of their lines such as had been done in Dundee, and 60 Corporation tramway undertakings in Britain did not have ½d. fares on any part of their system. Twelve systems on which ½d. fares were adopted did not pay their way. Regarding a suggestion that the Dundee 1d. maximum fare provided too generous conditions for those who resided near the extreme ends of the routes, Mr. Fisher points out that such fares encourage building at the outskirts, and enable the working classes to visit the country in a convenient and cheap fashion.

Glasgow.—The recent Conference of the members of the Municipal Tramways Association at Glasgow, and the civic hospitality extended to the representatives, was the subject of a rather heated discussion in the local T.C., when Mr. Lyon put a question to the convener of the Tramways Committee, bearing on the lavish hospitality afforded to the Association during its recent visit. Mr. Nelson explained that the Association consisted not only of tramway managers, but representatives from the leading municipalities in the kingdom. The arrangements were carried out on lines similar to those which obtained in other municipalities, and were made by the Sub-Committee. Mr. P. S. Stewart inquired if the Sub-Committee had been consulted in connection with five different functions given to the Association, and contended that Mr. Dalrymple was the whole Committee. Mr. Stewart threatened to have the standing orders suspended to open up the whole question, but was ruled out of order, and the discussion was closed.

At a later stage of the same meeting, Mr. Lyon asked for information as to when the Tramways Committee would report upon the remit from the T.C. in connection with the blind people travelling free upon the tramway cars. The sub-convener of the Tramways Committee replied that the requirements of every blind applicant in the city for tramway service were inquired into by arrangement with the Tramways Committee, and every applicant was supplied with an adequate supply of tokens.

The question of giving two present ½d. car stages for one ½d. has been discussed by the T.C. on a proposal to that effect by Bailie M'Mullan, who, in moving the proposition, expressed the opinion that not one member of the Corporation, from experience, would say that the two-stage fare had not been a success, and he questioned very much if they had lost any money at all, because they had had an increase of customers. He was convinced that the scheme would prove as successful as the two-stage one. Bailie Alstan thought the Committee should not be called upon to introduce innovations till May 31st, when the progress of the two-stage experiment would be reported upon. A direct negative was moved by Bailie Russell, the convener of the Tramways Committee, who promised, on behalf of the Committee, a full report at the end of May. The Lord Provost, having expressed the opinion that in future two of the present ½d. stages would be given for one ½d., recommended the withdrawal of the amendment on the ground that no harm would be done in the Committee reporting on the whole question. This was agreed to.

The T.C. has been recommended to pay £10,000 towards the cost of the construction of new bridges to carry the Corporation tramways over the Forth and Clyde Canal within the burgh of Clydebank, the authorities of the latter burgh to pay any additional costs which might be incurred.

Gosport.—The U.D.C. has decided to oppose the application of the Portsmouth Tramways for an order amending the route of the proposed tramways from Privett Road to Lee.

Hazel Grove and Bramhall.—The U.D.C. has decided to lease the tramways to the Stockport T.C. until 1926, at an annual rent of £645.

Leith.—The Sub-Committee of the Corporation Tramways Committee is considering a proposed extension, and has asked for a conference with the Edinburgh T.C., in view of the routes proposed for the railless trolley system in that city.

Liverpool.—Evidence of the continued prosperity of the Corporation electric tramways department was given at the last meeting for the municipal year of the Tramways Committee on Thursday, October 12th. Sir Chas. Petrie (chairman) in his review, said the nine months of the year had created another record. Passengers numbered 95,773,341, an increase of 2,266,686, or 2·4 per cent.; mileage was 9,235,431, an increase of 107,856, or 1·2 per cent.; receipts were £446,779, an increase of £13,616, or 3·1 per cent.; and the receipts per car-mile were 11·61d., an increase of ·22d. In the engineering department of the tramways a staff of about 370 men had been employed throughout the year at the Lambeth Road works. Fifteen new cars of the standard type will have been completed by the end of the year, making the total number of cars in service 561; of these 54 are first-class cars. During the year 88 cars were fitted with new running gear, making a total of 470 cars so equipped.

A memorial was submitted to the Committee from residents in Edge Lane and district, praying that electric cars should be laid in Edge Lane as soon as possible. It was announced that the Committee had authorised the city engineer to proceed with the construction of this section, and the lines will be laid at an early date.

Peru.—The concession for the construction and working of an electric tramway in Arequipa has been transferred from the Crédito Urbano de Arequipa (now in liquidation) to the Compania Anonima de Tranvia Electrico de Arequipa. The latter is allowed four months in which to draw up plans for the execution of the work.—*Board of Trade Journal.*

South Africa.—The Pretoria T.C. has decided to expend £48,000 on the extension of its tramway system; it is also intended to install a 1,000-KW. steam-driven generator, with boiler plant, &c.

Stockport.—The Corporation Tramways Committee has decided, subject to the consent of the T.C., to seek Parliamentary powers, in conjunction with Hazel Grove U.D.C., to run railless trolley cars from Marple to Stockport.

Widnes.—The following resolution was submitted at the last meeting of the T.C. on Tuesday, October 10th, by Councillor Lewis: "That, having regard to the success attending the introduction of motor-buses into the borough and the probable requirement of further provision to meet the public need in this respect, it be an instruction to the Committee to obtain expert advice on the practicability of an electric traction system of transit within the borough and the probable cost of installing and equipping such a system and maintaining and working the same." It was pointed out that the Committee was making inquiries into the question of electric tramways, and the subject was adjourned for two months, when it is hoped a report will be ready.

TELEGRAPH and TELEPHONE NOTES.

Automatic Telephone Patent.—An application is being made to the High Courts for the prolongation of the Strowger patent No. 809, of January 1898, for an automatic telephone system, on the ground that the inventor has not received an adequate financial return. The British patent is owned by the British Insulated and Helsby Cables, Ltd.

Hythe.—As the result of the interview between the Mayor of Hythe and the Post Office officials in London, the latter have agreed to lay the 64 wires mentioned in our last issue, underground in the High Street, thus removing the grievance of the T.C. The change will be made when the Post Office takes over the telephone system, and in the meantime the service will not be interfered with.

London and the Continent.—Experiments on telephonic communication between London and Basle, through Paris and Belfort—a distance of over 620 miles—have been carried out recently, with excellent results, thanks to the new loaded cable. Communication has also been effected with Amsterdam and several German cities.

Lundy Island Isolated.—For some weeks past Lundy Island, one of the most important signalling stations on our coasts, has been isolated, through a break in the cable connecting it to the mainland.

Night Letter Telegrams.—The German Government has introduced letter telegrams, which may be sent between 7 p.m. and midnight, to be delivered by the first mail in the morning, at a cost of one pfennig (¼d.) per word, the minimum number being 50, or, say, 6d. per message. If this plan were adopted here, we should have traffic on the lines, charged at one-fourth of the usual day rate, to be worked by operators on night duty, receiving higher pay, and working under more expensive conditions. The fact that the lines would be more fully utilised does not enter, for the revenue from the telegraphs does not cover working costs, let alone the capital charges.

Wireless Telegraph Patents.—We have received a letter from Messrs. Siemens Bros. & Co., Ltd., referring to a circular issued by Marconi's Wireless Telegraph Co., Ltd., in which the statement was made that "every wireless telegraphic installation, if it have any practical value, is an infringement of the Marconi patent." Messrs. Siemens Bros. state that the "singing spark" (Telefunken) system, of which they hold the exclusive rights in this country, has been proved in many installations all over the world to be capable of dealing with practical modern requirements, and they quote the opinion of Mr. W. R. Bousfield, K.C., and Mr. G. H. Hume, K.C., to the effect that the Telefunken arrangements in no way infringe the Marconi patent, No. 7,777 of 1909. They are therefore prepared to indemnify their customers against any action for infringement in respect of wireless telegraph installations supplied by them, and have decided to commence an action against the Marconi Co. for infringement of certain Telefunken patents, of which they are the assignees.

CONTRACTS OPEN and CLOSED.

OPEN.

Accrington.—October 28th. Gas-raising and by-product recovery plant, one 1000-H.P. gas engine, and one 750-KW. E.H.T. generator, for the Corporation. See "Official Notices" October 13th.

Australia.—Western Australia.—November 21st. One automatic or semi-automatic switchboard and equipment, for the P.M.G.'s Department. See "Official Notices" September 15th.

November 29th.—One portable hand-driven desiccating plant, and binders, sleeves, tapes and copper wire, for the P.M.G.'s Department. See "Official Notices" October 13th.

New South Wales.—December 20th. One branching multiple magneto switchboard at Broken Hill, for the P.M.G.'s Department. See "Official Notices" September 22nd.

November 15th.—Telephone cords and ear-pieces, for the P.M.G.'s Department. See "Official Notices" September 29th.

November 15th.—Magneto switchboards, &c., for the P.M.G. See "Official Notices" October 6th.

November 22nd.—Cable for the P.M.G.'s Department. See "Official Notices" September 29th.

Victoria.—November 28th. Ebonite earpieces, calculagraphs, and insulators for the P.M.G. See "Official Notices" October 6th.

December 12th.—Ebonite earpieces, telephone cords, bronze and copper wire, Bleeck-Love cells and charges, and telephone material, for the P.M.G.'s Department. See "Official Notices" to-day.

Belgium.—November 6th. The municipal authorities of Loochristi (Flanders) are inviting tenders for the concession for the supply of electrical energy for lighting and power purposes in the town.

Bradford.—November 11th. Stores for a year for the City Tramway Department. Tramway Offices, 7, Hall Ings (returnable deposit of £1 1s.).

Canada.—Lethbridge.—November 24th. Municipality. Power station equipment comprising boilers, economiser, steam turbo-generator, condenser and sub-station equipment; 10 per cent. deposit with tender. Plans, &c., from A. Reid, superintendent engineer, Lethbridge.

Dublin.—November 9th. The Corporation is inviting tenders for electrically-driven centrifugal pumps for the Ringsend pumping station. Specifications, &c., from the City Engineer, Town Hall, Dublin, or J. S. Alford, Esq., The Sanctuary, Westminster, London, S.W., on payment of a deposit of £5 5s. (returnable).

November 6th.—General stores for a year, for the Dublin United Tramways Co., Ltd. See "Official Notices" October 13th.

Edmonton.—October 25th. Installation of eight telephone instruments and line wires, also the overhauling of existing exchanges at Chase Farm Schools, Enfield, for the Edmonton Guardians. Specifications from the consulting engineers, Messrs. May & Hawes, Caxton House, S.W. (deposit £1).

Great Western Railway.—November 7th. Stores for a year. See "Official Notices" October 6th.

Hungary.—Tenders have recently been invited by the municipal authorities of Felsoor for the establishment of a central electric lighting station in the town.

London.—L.C.C.—October 24th. Sub-station plant and machinery. See "Official Notices" September 15th.

November 6th.—Stores for a year. See "Official Notices" to-day.

Norway.—November 1st. Norwegian State Telegraph Department. 200,000 insulators (No. 2). Tenders, marked "Anbud paa isolatorer Nr. 2," to the "Telegrafdirektörens kontor," Christiania. Local representation by a resident agent is required. A copy of the specification (in Norwegian), together with a drawing, may be seen by British makers at the Commercial Intelligence Branch of the Board of Trade, London, E.C.

January, 1912.—Norwegian Army Authorities. New field telephones for the Norwegian infantry; 100 sets. Tenderers must furnish to the Military Authorities at Christiania, two sets of apparatus with description and other details. Local representation by a resident agent is required.—*Board of Trade Journal.*

The State Railway Administration at Elfkarleby are prepared to consider proposals for the supply and erection of turbines at the local State electric station. Tenders must be forwarded on or before December 1st.

Radcliffe.—November 7th. Two 300-kw. rotary converters and transformers, and E.H.T. switchgear for the U.D.C. See "Official Notices" to-day.

Rochdale.—Installation of electric lighting at Smith Street Baths. Particulars from P. W. Hathaway, A.R.I.B.A., Town Hall, Rochdale.

Sheffield.—November 13th. One 5,500-kw. steam turbine, condensing plant, pumps, pipework, &c., and alternator and exciter, for the Corporation. See "Official Notices" October 13th.

Siam.—December 30th. Tenders are invited for five electrically-driven centrifugal pumps for the waterworks at Bangkok. Particulars, Local Sanitary Department, Bangkok.

South Africa.—November 22nd. Posts and Telegraph Department. Tenders for power-generating plant, consisting of motor-generator, accumulators, switchboard, &c. Forms of tender and specifications from either District Stores Clerk, G.P.O., Johannesburg, or Controller of Stores, G.P.O., Capetown.

Spain.—November 16th. The Colonial Section of the Spanish Ministry of State in Madrid is inviting tenders for the supply and establishment of a wireless telegraphy station on the island of Fernando Po.

The municipal authorities of Malgrat (province of Barcelona) have just invited tenders for the concession for the electric lighting of the town during a period of 10 years.

Taunton.—200-k.v.a. single-phase alternator, superheater, cables, and induced-draught fans for the Council. See "Official Notices" October 6th.

Truro.—October 21st. Installation of private internal telephone system, at the new offices, for Cornwall C.C. Clerk of the Works.

Uxbridge.—October 23rd. Electric light installation in two hospital blocks at the Kingston Lane Hospital, Hillingdon, Uxbridge, for the Joint Hospital Board. Specification, &c., at the office of C. Woodbridge, Clerk to the Board, 38, High Street, Uxbridge.

CLOSED.

Australia.—According to the *Australian Mining Standard*, the Gawler (South Australia) T.C. recently accepted the following tenders in connection with its electrical installation:—

W. McLean & Co.—72-b.h.p. Gardner gas engine, £703; dynamo and sundries, £740; service meters, £154; aluminium cables, £225.
Warburton, Franki & Co.—Set of accumulators, £397.
British General Electric Co.—Transformers, £131; switches and instruments, £85.
Siemens Bros. Dynamo Works, Ltd.—Switches and fuses, £12.
Kynoch, Ltd.—Gas producer, £177.

According to the *Australian Mining and Engineering Review*, the Goulburn (Victoria) Shire Council has accepted the following tenders in connection with the electric lighting and power scheme for the town of Nagambie:—

R. Hornsby & Sons.—66-h.p. suction gas plant, £735.
N. Guthridge, Ltd.—Generator, booster and motor, £250.
Warburton, Franki & Co.—Switchboard, £94.
Noyes Bros. (Melbourne) Pty., Ltd.—Copper cables.
I.-R., G.-P. and Telegraph Works Co., Ltd.—Fuse-boxes and meters.

Tenders have also been accepted for a 540-a.h. storage battery, at £445, and metallic-filament lamps, at £14.

Batley.—The T.C. has accepted the tenders of Messrs. Crawshaw & Warburton, the Howley Park Coal Co., the Soothill Wood Colliery Co., Messrs. J. Critchley & Sons, Ltd., and the White Lee Colliery Co., for coal and slack for the electricity works.

Belfast.—The tender of Messrs. Craig & Paton, Gret Victoria, for the installation of conductors and equipment for light and power purposes at the new abattoir, has been accepted, at £505.

Bury (Lancs.).—The T.C. has accepted the tender of the Switchgear Co., of Salford, for two regulating switches for the battery.

Dundee.—The offer of Messrs. Lowdon Bros., Dundee, for the electric lighting and power distribution system at the new engineering laboratories at University College, has been accepted.

Harwich.—Messrs. Mann, Egerton & Co., of Ipswich, have secured the contract for the electrical installation at the new picture palace to be erected at Harwich.

London.—L.C.C.—The Fire Brigade Committee received the following tenders for an electrically-driven motor turntable long ladder:—

Cedes Electric Traction, Ltd. .. £1,137, plus £198 for spare wheels, &c.
J. Morris & Sons, Ltd. .. .. £1,380, „ £245 „ „

The Cedes Co.'s tender has been accepted, and the sub-contractors are Messrs. Johnson & Phillips, Ltd., for the chassis with wheel motors, and the Tudor Accumulator Co., for batteries.

Shoreditch.—The B.C. has accepted the tender of Messrs. Pooley & Austin, at £60, for the supply of a motor-generator for cinematograph purposes, to be installed at Hoxton Baths. The other tenders were: Union Electric Co., £59, who refused to incur any penalty for non-delivery to time; and the Electric Construction Co., £66 10s.

Lowestoft.—The T.C. has accepted the tender of Hadfield's Steel Foundry, Ltd., for four sets of tramway points, at £49 10s.

Morecambe.—The Tramways Committee has provisionally accepted the tender of Mr. W. J. Pearce, for doubling the track from Lord Street to Bare.

Pembroke (Co. Dublin).—The U.D.C. has placed an order with Messrs. Ed. Bennis & Co., Ltd., for two of their independent elevators for the electricity works, one to serve a single Lancashire boiler, and the other to feed two. The Council has also ordered six hatchway frames with removable doors through which the coal will be fed into the storage bunkers.

Portsmouth.—The T.C. has accepted the tender of Messrs. W. T. Glover & Co., Ltd., for low-tension rubber-insulated cables, at £222.

Sunderland.—At a meeting of the T.C. on the 11th inst. the Electricity and Lighting Committee recommended that the following tenders be accepted:—

Ferranti, Ltd.—Meters.
British Insulated and Helsby Cables Co.—250 house service fuse-boxes.
J. Grabham, Sunderland.—Painting work at Hylton Road and Dunning Street works.
Sunderland Forge and Engineering Co.—Supply and fixing of a new half-coupling in connection with the removal of the No. 8 Dynamo from Dunning Street to Hylton Road.

The report was accepted.

Swinton and Pendlebury.—The U.D.C. has accepted the tender of Messrs. F. W. Smith & Co., at £38, for the erection of an overhead line for the supply of electricity to the Swinton Industrial Schools.

Watford.—The U.D.C. has decided to renew for a year the contracts with Messrs. W. Cory & Son, Ltd., and Messrs E. Foster & Co. for coal for the electricity works. The U.D.C. has also accepted the tender of the Clay Cross Co. for a suction pipe for the turbo-condenser, at £67.

TRADE STATISTICS OF SWEDEN.

The following figures show the imports of electrical and similar goods into Sweden during the year 1909, and are taken from the official statistics which have recently been issued; the figures for 1908 are given for purposes of comparison, and notes of any increases or decreases have been added.

	1908. Kronor.	1909. Kronor.	Increase or decrease. Kronor.
Electric meters.—			
From Germany	564,000	402,000	—162,000
„ Great Britain ...	49,000	30,000	— 19,000
„ Other countries ...	4,000	3,000	— 1,000
Total ...	617,000	435,000	—182,000
Electric incandescent lamps.—			
From Germany	267,000	402,000	+135,000
„ Great Britain ...	3,000	—	— 3,000
„ Other countries ...	11,000	12,000	+ 1,000
Total ...	281,000	414,000	+133,000
Dynamos and parts thereof.—			
From Germany	266,000	132,000	—134,000
„ Great Britain ...	4,000	1,000	— 3,000
„ Switzerland ...	57,000	127,000	+ 70,000
„ Austria	—	16,000	+ 16,000
„ Other countries ...	12,000	17,000	+ 5,000
Total ...	339,000	293,000	— 46,000
Electric motors and parts thereof.—			
From Germany	485,000	378,000	—107,000
„ Great Britain ...	35,000	19,000	— 16,000
„ Switzerland ...	12,000	127,000	+115,000
„ United States ...	16,000	15,000	— 1,000
„ Other countries ...	18,000	14,000	— 4,000
Total ...	566,000	553,000	— 13,000
Transformers and parts thereof.—			
From Germany	187,000	238,000	+ 51,000
„ Great Britain ...	1,000	1,000	—
„ Switzerland ...	15,000	—	— 15,000
„ Austria	—	115,000	+115,000
„ Other countries ...	—	3,000	+ 3,000
Total ...	203,000	357,000	+154,000
Telephone apparatus.—			
From Germany	15,000	12,000	— 3,000
„ Great Britain ...	1,000	1,000	—
„ Other countries ...	3,000	1,000	— 2,000
Total ...	19,000	14,000	— 5,000
Telegraph apparatus.—			
From Denmark	3,000	5,000	+ 2,000
„ Germany	4,000	1,000	— 3,000
„ Great Britain ...	1,000	1,000	—
Total ...	8,000	7,000	— 1,000
Gas motors.—			
From Germany	249,000	102,000	—147,000
„ Great Britain ...	45,000	23,000	— 22,000
„ United States ...	5,000	41,000	+ 36,000
„ Other countries ...	9,000	3,000	— 6,000
Total ...	308,000	169,000	—139,000
Petroleum and benzine motors.—			
From Germany	45,000	63,000	+ 18,000
„ Denmark	12,000	26,000	+ 14,000
„ Great Britain ...	47,000	7,000	— 40,000
„ France	30,000	10,000	— 20,000
„ United States ...	99,000	74,000	— 25,000
„ Other countries ...	16,000	23,000	+ 7,000
Total ...	249,000	203,000	— 46,000
Turbines.—			
From Norway	2,000	111,000	+109,000
„ Germany	6,000	3,000	— 3,000
„ Great Britain ...	24,000	—	— 24,000
„ Switzerland ...	29,000	—	— 29,000
Total ...	61,000	114,000	+ 53,000
Accumulators.—			
From Germany	627,000	477,000	—150,000
„ Great Britain ...	6,000	7,000	+ 1,000
„ Other countries ...	6,000	2,000	— 4,000
Total ...	639,000	486,000	—153,000
Rheostats.—			
From Germany	866,000	689,000	—177,000
„ Great Britain ...	14,000	10,000	— 4,000
„ Switzerland ...	123,000	42,000	— 81,000
„ Other countries ...	16,000	15,000	— 1,000
Total ...	1,019,000	756,000	—263,000
Elevators.—			
From Germany	61,000	81,000	+ 20,000
„ Holland	—	99,000	+ 99,000
„ Great Britain ...	43,000	4,000	— 39,000
„ Other countries ...	13,000	14,000	+ 1,000
Total ...	117,000	198,000	+ 81,000
Cranes.—			
From Germany	245,000	134,000	—111,000
„ Great Britain ...	136,000	56,000	— 80,000
„ United States ...	100,000	10,000	— 90,000
„ Other countries ...	39,000	25,000	— 14,000
Total ...	520,000	225,000	—295,000
Copper wire, twisted, and cable not insulated.—			
From Germany	76,000	117,000	+ 41,000
„ Great Britain ...	21,000	—	— 21,000
„ Other countries ...	10,000	—	— 10,000
Total ...	107,000	117,000	+ 10,000
Copper wire covered with textiles.—			
From Germany	8,000	6,000	— 2,000
„ Other countries ...	3,000	1,000	— 2,000
Total ...	11,000	7,000	— 4,000
Copper wire covered with rubber.—			
From Germany	12,000	5,000	— 7,000
„ Other countries ...	—	1,000	+ 1,000
Total ...	12,000	6,000	— 6,000
Electric cables covered with lead.—			
From Germany	2,774,000	2,767,000	— 7,000
„ Holland	44,000	43,000	— 1,000
„ Great Britain ...	188,000	251,000	+ 63,000
„ Other countries ...	67,000	7,000	— 60,000
Total ...	3,073,000	3,068,000	— 5,000
Copper wire otherwise insulated.—			
From Germany	356,000	252,000	—104,000
„ Great Britain ...	65,000	15,000	— 50,000
„ Other countries ...	3,000	1,000	— 2,000
Total ...	424,000	268,000	—156,000
Other electric cable.—			
From Germany	192,000	226,000	+ 34,000
„ Great Britain ...	3,000	3,000	—
„ Other countries ...	1,000	2,000	+ 1,000
Total ...	196,000	231,000	+ 35,000
Steam turbines.—			
From Germany	18,000	64,000	+ 46,000
„ Great Britain ...	64,000	7,000	— 57,000
„ Switzerland ...	54,000	319,000	+265,000
„ Other countries ...	23,000	3,000	— 20,000
Total ...	159,000	393,000	+234,000
Steam boilers.—			
From Germany	87,000	115,000	+ 28,000
„ Great Britain ...	147,000	75,000	— 72,000
„ Other countries ...	35,000	19,000	— 16,000
Total ...	269,000	209,000	— 60,000

Krone = 1s. 1½d.

Electricity in Mines.—We read in the *Times* that the Mining Association of Great Britain met on 13th inst., in London, to discuss the provisions of the Mines Regulation Bill which relate to the use of electricity in mines. "The owners are opposed to the compulsory provision of certain expensive precautions which, they contend, would be no more effective than others much less costly. They are of opinion that some of the cost of the precautions must inevitably come out of the wages of the men. It was resolved to submit certain amendments to the House of Commons on the report stage."

FORTHCOMING EVENTS.

Electro-Harmonic Society.—Friday, October 20th. At 8 p.m. At the King's Hall, Holborn Restaurant. Smoking concert.

Olympia Electrical Exhibition.—Saturday, October 21st. Closing day.

Institution of Engineers and Shipbuilders in Scotland.—Tuesday, October 24th. At 8 p.m. At the Rankine Hall, Glasgow. Presidential address by Mr. E. Hall-Brown.

Physical Society.—Friday, October 27th. At 5 p.m. At the Imperial College of Science, South Kensington. Papers on "Further Observations on the Afterglow of Electric Discharge and Kindred Phenomena," by the Hon. R. J. Strutt; and "Homogeneous Fluorescent X-Radiation of a Second Series," by Prof. C. G. Barkla and Mr. J. Nicol.

Institution of Electrical Engineers (Manchester Local Section).—Friday, October 27th. At 7.30 p.m. At the University, Manchester. Address by Mr. W. Cramp.

Association of Engineers-in-Charge.—Saturday, October 28th. At 6.30 p.m. At Liverpool Street Hotel. Social. Ladies' night.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

Commanding Officer—Col. H. M. Leay.

The following orders are issued:—

Drills for efficiency (1911-1912) will commence at Headquarters on Thursday, November 2nd, 1911, and Headquarters will be open as stated below from that date:—

Daily (except Saturdays), 10 a.m. to 10 p.m.
Saturdays (unless otherwise ordered), 10 a.m. to 12 noon.

(Signed) P. H. Campbell, Capt. R.E., Adjutant for O.C. London Electrical Engineers.

NOTES.

British Electrical and Allied Manufacturers' Association (Incorporated) Inaugural Dinner.—On Thursday last week the reorganisation of the "National Electrical Manufacturers' Association" was celebrated by a dinner at the Hotel Cecil, at which there were some 250 guests. Mr. S. Z. de Ferranti, President of the Institution of Electrical Engineers, occupied the chair, and in proposing "The Association," claimed to be an old manufacturer, but regarded himself as an outsider in this case, and could therefore say things which otherwise he could not. Since he had become President of the Institution, the fact had forced itself upon his attention that the electrical industry was not as prosperous as it should be. This was partly due to the impression that there were divergent interests in the industry, but that was a mistaken view. This country depended upon its manufactures, and it was beneficial to the country that its manufacturers should be prosperous, otherwise they could not make progress. It was vital to the buyer that the manufacturer should be prosperous. There must be more common sense amongst the manufacturers; what was the use of killing each other for an apparent good that never came? Let them know each other as good friends. This dinner was a most happy occurrence, and nothing but good could result to the manufacturers, buyers and users of electrical machinery from their working together with goodwill. There had been too much competition in pure *price;* what was wanted was reasonable competition in price, but keen competition in excellence. Then England would lead the world in electrical manufactures, and he looked to the Association to do everything possible towards that end.

Mr. Nalder, Chairman of the Association, in response, thanked Mr. Ferranti most emphatically for the sound commonsense and good advice which he had given them. The Association, he said, had been in existence for eight or nine years, operating on a modest scale, and had done some good and useful work. It had certainly brought competitors together. Manufacturers had been "pestered" in the past by local exhibitions, but had taken the matter into their own hands and held three exhibitions, of which the last would be the most successful. Recognising the necessity of expansion, the Association had recast its articles and reorganised its mechanism; larger subscriptions were necessary, and the Council was sure that it would be able to show good results for the money. "The trend of modern commerce was to temper competition by conference," and if they would only pull together the result would be to their advantage.

Mr. A. Bruce Anderson, in proposing "The Industry," emphasised the importance of the occasion. The Empire had to live by its industries, of which the electrical industry was second to none other. If they did not work together, they would not achieve success. Let them give the manufacturer his due; they were all buyers as well as sellers, but he would for the moment distinguish the makers from the users of machinery, for amongst the latter were some who declared that they would not buy from members of the Association, but would buy abroad. He did not complain of the power to buy abroad, but he asked such to consider where this policy would lead to. For what purpose did they buy plant?—to light our houses, carry our workmen, &c. The process of buying in a market where they could not sell could not go on indefinitely. Electricity suppliers valued the manufacturers' power load; the manufacturers would increase it if they could. Shareholders were deeply interested in British manufacturers' progress; employés were *vitally* interested, and in effect they were all employés. The electrical industry was one and indivisible, and there was no real distinction between buyer and seller. He hoped to see an association representing the whole of British industry. The Manufacturers' Association had created an organisation for putting to them certain things; let them remember that the manufacturer was their fellow-creature and their fellow-countryman, and not buy abroad if they could help it. If work was going abroad—and it was going abroad—while British workmen stood idle, it was a shameful fact. By strengthening the manufacturer they strengthened the industry, and in turn the country. They best helped themselves who helped one another, and that was the spirit in which the Council meant to go forward. Mr. James Swinburne, in reply, paid a tribute to Mr. Ferranti, and pointed out that the harm done by legislation to the electrical industry was not a thing of the past, but an active agency of the present. He adduced the attitude of Parliamentary Committees towards industrial proposals, and their utter indifference towards the welfare of the community—if there was any possibility of making a profit, it must be squashed, and every possible hindrance must be placed in the way of the promoters. All ought to do their best to alter public opinion on these matters. The British workman himself should be educated; for he thought there was only a certain amount of work in the world, and therefore it must be done slowly lest it be used up. Again, he thought nine-tenths of the fruit of his labour went into the pockets of "the idle rich," whoever they might be; and thirdly, he had a curious conception of the State as a wealthy body with unlimited powers. His hearers themselves might with advantage study the science of Economics, which was of vital importance to the industry and to the welfare of the whole country.

Mr. Swinburne further recommended the classification of catalogues, which at present were of the most diversified sizes and shapes, and most inconvenient to handle. It was impossible to file them or arrange them to advantage. If the manufacturers would try and realise what the consulting engineers had to do with catalogues, they might standardise them.

Mr. Hugo Hirst proposed "The Guests," and said that if the efforts of the Association were rewarded with only 50 per cent. of what was aimed at, they were well worth making. In this or any other State, the Government never did anything except under the pressure of public opinion; this Association was formed, knowing what was required, to influence public opinion, and thus to obtain the measures desired. They were not promoting trusts or cartels—they were doing a national duty in promoting the welfare of one of their most important industries. The wealth of the Empire consisted in what it could produce daily; therefore let them go about their work with the lofty spirit indicated by those who had already spoken. Some of the grievances from which they suffered were due to their own fault. If this Association were a success, they could achieve some of the results that would accrue from that policy which he was known to favour, which, however, was not an item in the Association's programme. They suffered from foreign competition; one reason was that they did not consider sufficiently the home middleman. Rushing to the public at low prices, they left no room for the distributor, and drove him into the hands of the foreigner; he would like to supply British-made goods, but had not the opportunity, and had to buy foreign goods, sold at dumping prices. If they could regulate the selling prices to the public, and standardise certain lines, leaving a sufficient margin for the middleman, they would reduce foreign imports and increase the number of their allies. The Post Office bought exclusively British-made goods where possible, and was no loser thereby. Australia had offered preference, which had been increased through the efforts of Capt. Collins. Major O'Meara, in reply, speaking as a buyer, expressed his gratitude to the manufacturers for their efficient assistance. He hoped the Association would prove successful in its objects. Capt. Collins (secretary to the Commonwealth of Australia in Great Britain), also replying, referred to the constantly increasing applications of electricity as exemplified at Olympia, and said they should lose no time in establishing an Imperial system of wireless communication. They in Australia were anxious to promote British enterprise in every way, and he noted with satisfaction the improvement in electrical trade with Australia.

Mr. B. Longbottom, proposing the health of "The Chairman," eulogised his services to the electrical industry; the toast was drunk with musical honours, and Mr. Ferranti, in the course of a brief reply, said that if he could be of even a little assistance to them he would be amply repaid, and he wished them and their endeavours every success.

Exhibition.—An engineering and machinery exhibition is being arranged for at Olympia next year (October 4th to 26th), and the whole of the hall, except the part under the gallery, will be reserved for machinery to be shown in motion.

Advertising at Olympia.—An exceptionally "taking" advertising scheme was carried out by Messrs. Magic Appliances, Ltd., on Saturday last. In addition to occupying the whole of the front page of the *Daily Mail* with a display of the "Magic" suction cleaner, the firm engaged a bevy of smart housemaids to perambulate the promenade in front of the main entrance of the Exhibition, each armed with a Magic cleaner. Naturally the animated advertisement attracted universal attention, and the firm are to be congratulated upon their unique and effective methods of securing the utmost publicity.

Institution and Lecture Notes.—Institution of Electrical Engineers (Manchester Section).—On Friday next the 1911-12 session opens at the Physical Laboratory of the University, Manchester, with an address by Mr. W. Cramp (chairman). The programme of the meetings thereafter is as follows:—

Tuesday, November 7th.—R. Roberts: "The Mechanical Design of Direct-Current Turbo-Generators."
November 15th.—Joint meeting with the Liverpool Engineering Society, at Liverpool.
Prof. E. W. Marchant: "The Function of the Laboratory in the Training of an Engineer."
November 28th.—R. Rankin: "Automatic Reversible Battery Boosters."
December 12th.—Miles Walker and H. D. Symons: "Heat Conductivity in Electrical Machinery."
January 16th.—Karl Baumann: "Recent Developments in Turbine Practice."
January 27th.—Meeting with the Manchester Association of Engineers. (By invitation.)
Cecil Myers: "Electrical Furnaces."
February 13th.—Fred. S. Sells: "Specifications."
February 23rd.—Annual Dinner.
February 27th.—J. Lustgarten: "High-Tension Porcelain Insulators."
March 12th.—F. W. Carter: "The Mechanics of Electric Train Movement."
March 26th.—Prof. A. Schwartz and R. G. Cunliffe: "The Corrugation of Rails."
April 16th.—J. F. Crowley: "Recent Developments in the Application of Electricity in Textile Factories."
April 30th.—Annual general meeting. Lecture by Dr. R. Thury.

On October 6th, Mr. F. H. Taylor delivered the second of his popular lectures on "Recent Developments in Electric Lighting," at the Willesden Polytechnic. He also dealt with electric heating and cooking, and many of the well-known apparatus were shown, their construction being explained. It was suggested that the Willesden District Council should arrange with Mr. Taylor to give similar lectures in various parts of the borough to educate the public concerning the advantages of electric lighting and heating, and Councillor Harvey promised to bring the matter forward.

I.E.E. (Manchester Students).—The opening meeting of the Students' Section takes place on Tuesday, October 31st, at the Manchester School of Technology, when Mr. J. F. C. Snell will deliver an address, in which will be included, amongst other things, a lantern description of one of the modern power stations in South America for which he has been responsible. Mr. W. Cramp will preside.

The first of the special series of 12 lectures on "Illumination," arranged to take place at Battersea Polytechnic, was delivered by Prof. J. T. Morris on Tuesday, October 17th, the subject being incandescent lamps.

It Certainly Should be.—"The practice must be stopped, if possible," observed the Stipendiary Magistrate at the Manchester City Police Court, on Friday last, in imposing a fine of 5s. and costs in three cases where the defendants were charged with spitting on tramcars, contrary to the by-law.

Electric Police Lamps for Glasgow.—The Police Committee of Glasgow T.C. has decided to replace constables' oil lamps with electric torches, and 100 torches are to be obtained, while the electrical engineer is to have a charging switchboard and motor installed at the police headquarters, at an estimated cost of £90.

The U.S. Electric Lamp Combine Dissolved.—The *Evening Standard* of October 13th states that "the United States District Court has decided the suit against the electric companies brought in March last in favour of the Government, and orders the dissolution of the National Electric Lamp Co. and 35 subsidiary companies. The decree is a sweeping one, and restores the conditions which prevailed before the trust agreement was entered into. The defendants had announced their willingness to plead guilty, and accept the mercy of the Court."

Reuter in a Washington dispatch says that the Attorney-General says that this decision has established precedents of great value to the Government in its prosecutions under the Anti-Trust Law.

The above appears to bear on the prospects of the leasing of the British cables, and placing them all under one control, being adjudged illegal.

Inquiry.—A correspondent asks for information as to the Paragon pump, name of makers, &c.

The Continental Glow Lamp Industry.—At the recent meeting, in Berlin, of the German and Austrian cartel of carbon glow lamp manufacturers, the situation of the industry, more particularly with regard to the competition of the metal-filament lamp manufacturers, was exhaustively discussed. It was eventually decided to maintain the union until April, 1912. The cartel agreement lapses in 1913.

Manchester Wiremen's Demands.—The electrical wiremen employed in the building trade in Manchester, who are reported to number 500, on Thursday night last week determined to demand an increase of wages. At present the men are receiving 8½d. an hour, and they are intent on having 9½d.

Secret Commissions and Bribery Prevention League, Inc.—A public conference will be held at the Mansion House, London, on Tuesday, October 24th, at 3.30 p.m., to further the efforts of the League in making known the Prevention of Corruption Act, 1906, and in enforcing its provisions, the Lord Mayor presiding. Mr. E. B. Ellington, president of the Institution of Mechanical Engineers, has written to the Secretary of the League, saying that "the most important point of all is to foster a strong public opinion in favour of honest dealing, and the passing of the Prevention of Corruption Act in 1906 is a very useful expression of such public opinion. I should not be disposed to place much reliance on the Act itself."

Football: The Davis Challenge Cup.—We are asked to state that the General Electric Co.'s Athletic Club cordially invites application from football clubs in the electrical trade (non-league) London and district, to enter for the above cup. Further particulars can be obtained from the secretaries of the club, Messrs. H. Chard and J. Peters, 67, Queen Victoria Street, London, E.C.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Central Station Officials.—Mr. W. Wood, of Leeds, has been appointed switchboard attendant, and Mr. T. Smith, of Wakefield, junior mains assistant, at the Dewsbury Electricity Works.

Mr. E. E. Hamar, shift engineer with the Kent Electric Power Co., has been presented with a marble timepiece by the staff and employés on the occasion of his marriage.

The Southampton T.C. has decided to increase the salary of Mr. H. L. Mills, assistant borough electrical engineer, from £250 to £260 per annum, rising by annual increments of £10 to £300 per annum.

Mr. Alfred E. Ricketts, sub-station superintendent of Poplar Borough Council electricity department, was married to Miss Margaret Anderson, on 14th inst., at Plimsoll Street Presbyterian Church, Poplar. Mr. Ricketts was formerly in the employment of Messrs. Cowans, Ltd., of Manchester.

The Electrical Committee of the Bristol T.C. has decided that as from March 25th last all premiums received with improvers entering the electricity works shall be retained by the Corporation, and that in lieu of the fees being divided between the Corporation and the engineer, the latter's salary shall be increased by £100 per annum. The average received in fees during the past 10 years by the engineer has been £102 per annum.

Tramway Officials.—The Bournemouth T.C. has appointed Mr. F. Wiltshire as second shift engineer on the tramway staff.

General.—Mr. Alfred H. Gibbings, who for so many years was well known in connection with public electrical supply and tramway undertakings in this country, and whose large projected electric power scheme in Scotland was rendered impossible by Clause 23 of the Electric Lighting (Consolidation) Act, 1909, has launched out in another field, where, from what one hears of the business possibilities, he should meet with success. He has opened business at Buenos Ayres as Alfred H. Gibbings y Cia. as electrical engineers, and he is also associated with the firm of Scott & Hume (recently Alejandro Hume, Scott & Hume) in a partnership arrangement. The firm of Alfred H. Gibbings & Cia. are representing Messrs. J. H. Howden & Co., Ltd., Messrs. Ernest Scott & Mountain, Ltd., Mr. Bertram Thomas, Messrs. Drake & Gorham, Ltd., Messrs. Nalder Bros. & Thompson, Ltd., the Bastian Meter Co., Ltd., and Messrs. Boothroyd & Co., Ltd., of Liverpool. The firm of Scott and Hume has been connected with railway enterprise in Argentina since 1867, and in conjunction with Messrs. John C. Meiggs, Sons & Co., of London, financed and constructed 540 miles of narrow-gauge railway for the Santa Fé Provincial Government. Later the firms jointly constructed and equipped 125 miles of the Central Cordoba Railway, 521 miles of the Central Northern, 412 miles of the Central Entre Rios, and 125 miles of the Bahia Blanca and North-Western Railway, up to the end of 1892. Afterwards the firm entered into a working agreement with Messrs. Pauling & Co., Ltd., which was recently terminated on the death of Mr. Alexander Hume. A very extensive experience such as this, placed in conjunction with Mr. Gibbings's extended electrical knowledge, should be of great value in negotiating and executing contracts. Mr. Gibbings's many friends in this country will no doubt join with us in wishing him a large measure of success in his new sphere of activity.

According to the American *Electrical Review and Western Electrician*, on September 28th, Mr. Samuel Insull, president of the Commonwealth Edison Co., gave a dinner in honour of Mr. S. Z. de Ferranti, President of the I.E.E. On the following day luncheon was given in honour of Mr. Ferranti by the officers of the American Institute of Electrical Engineers, at the Engineers' Club, New York. Other English electrical men present included Mr. Arthur Wright and Mr. C. H. Merz.

Mr. J. W. Meares, electrical adviser to the Indian Government, left this country for India on the 19th inst., on the P. & O. steamer *Morea*.

Mr. R. B. Coney, superintendent of the electrical department at Uttoxeter for the North Staffs. Railway Co., has been presented by the Stoke-on-Trent headquarters' staff with a silver cigar-case as a mark of esteem.

We announced last week that Messrs. Ozonair, Ltd., had appointed Mr. R. Borlase Matthews, Wh.-Ex., to the position of manager. This is in consequence of the extension of their business, Mr. Edward L. Joseph, managing director, will still continue to give the same personal attention to the business.

Ald. Geo. Weeks, head of the firm of G. Weeks & Son, electrical contractors, High Street, Bromley (Kent), is mayor-elect for the borough.

Obituary.—Sir Wm. Crossley.—We regret to record the death of Sir William Crossley, Bart., which occurred on October 12th at Manchester, at the age of 67 years. Sir William was one of the founders of the well-known gas engine firm of Crossley Bros., Ltd., the other being his brother, the late F. W. Crossley. He was also one of the original directors of the Manchester Ship Canal. The deceased gentleman was made a Baronet in 1909. In politics he was a Liberal, being elected M.P. for Altrincham Division in 1906 and in 1910: at the second election of the latter year he was defeated. He took a deep interest in movements for the amelioration of the lot of the sick and poor; for these his generosity often took a substantial form. To a consumptive sanatorium scheme alone he devoted no less than £70,000. The funeral took place at Bowden on Monday.

We regret to record the death of Mr. Edward Pyke, J.P., of Preston and Merton Bank, Southport, whose remains were interred at the Preston Cemetery on Friday last. Deceased was Preston's oldest magistrate, and he was a director of the National Electric Supply Co.

NEW COMPANIES REGISTERED.

Reno, Ltd. (117,987).—This company was registered on October 9th, with a capital of £5,000 in £1 shares (1,000 5 per cent. cumulative preference), to take over the business carried on by the Reno Electric Stairways and Conveyors, Ltd., of Eagle Wharf Road, Hoxton. The subscribers (with one share each) are:—H. C. Walker, 33, Wickham Road, Brockley, S.E., engineer; W. H. Aston, 46, Eagle Wharf Road, Hoxton, N., engineer. Private company. The number of directors is not to be less than two or more than five; the first are H. C. Walker, W. H. Aston and H. Harmsworth. Registered office, Falmouth Road, S.E.

Long & Crawford, Ltd. (118,040).—This company was registered on October 12th, with a capital of £1,000 in £1 shares, to carry on the business of electrical engineers and contractors, dealers in electrical and mechanical apparatus, machines and accessories, &c. The subscribers (with one share each) are:—E. Long, 7, Birchdale Drive, Romiley, Chester, electrical and mechanical engineer; R. Crawford, Milton, Bearsden, Glasgow, electrical and mechanical engineer. Private company. The number of directors is not to be less than two or more than three; the first are E. Long and R. Crawford; qualification, £100. Registered by Jordan & Sons, Ltd., 116-117, Chancery Lane, W.C.

Leominster Electric Supply Co., Ltd. (118,025).—This company was registered on October 11th, with a capital of £4,000 in 2,000 ordinary shares of £1 each, and 400 5 per cent. cumulative preference shares of £5 each, to carry on the business indicated by the title. The subscribers (with one share each) are:—J. H. Edwards, 127, Victoria Street, Bristol, electrical engineer; S. Williams, All Saints House, The Exchange, Bristol, solicitor. Private company. The number of directors is not to be more than five. J. H. Edwards is the first managing director; qualification, 50 ordinary shares. Registered by Seymour Williams & Co., 38, Parliament Street, S.W.

Winscombe Electric Light and Power Co., Ltd. (118,016).—This company was registered on October 10th, with a capital of £2,000 in £1 shares, to carry on at Winscombe and elsewhere in Somerset the business of an electric supply company in all its branches. The subscribers (with 100 shares each) are:—J. W. Bobbett, Goathurst, Winscombe, gentleman; J. E. Counsell, Longfield, Winscombe, gentleman; W. Yatman, The Hall, Winscombe, gentleman; J. Grubb, The Down, Winscombe, gentleman; H. W. Thompson, Coombe House, Winscombe, gentleman; W. Reed, Hale House, Winscombe, gentleman; T. Carwardine, Berrymead, Winscombe, gentleman. Minimum cash subscription, £1,000. The number of directors is not to be less than four or more than six; the first are J. W. Bobbett, J. E. Counsell, W. Yatman, J. Grubb, H. W. Thompson and W. Reed; qualification, £100. Registered office, Longfield, Winscombe, Somerset.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Church Stretton Electric Supply Co., Ltd. (80,857).—Deed of further charge dated August 19th, but executed on September 14th, 1911, to secure £75, charged on freehold land at Crossways, Church Stretton. Holder: E. Bond, 43, Thurloe Square, S.W.

Bray, Markham & Reiss, Ltd. (74,871).—Return dated August 2nd, filed August 28th, 1911. Capital 20,000 in £1 shares. 8,000 shares taken up. £8,000 paid. Mortgages and charges: Nil.

CITY NOTES.

Allgemeine Elektrizitäts Gesellschaft.

The accounts of this company for 1910-11, after deducting working expenses, taxes, interest on loans, and provision for depreciation which is not specificially mentioned, show net profits exclusively from manufacturing and sales amounting to £1,107,000, as compared with £921,000 in 1909-10. It is proposed to pay a dividend of 14 per cent. on share capital of £5,000,000, and 7 per cent. on the new shares of £1,500,000 which are entitled to participate as from January 1st, 1911. In addition to the provision made for depreciation according to the custom hitherto, it is intended to add £118,000 to the reserve fund and devote £37,500 as reserve for the extension of the business premises. The issue of new shares of nominally £500,000 yielded a premium of £431,000 to the legal reserve fund, which, including the before-stated allocation of £118,000, becomes increased to £2,436,000. The turnover in the first two months of the new financial year and the orders on hand exceed those prevailing at the corresponding time in 1910. The dividend of 14 per cent. contrasts with a similar rate in 1909-10, 13 per cent. in 1908-9, and 12 per cent. in each of the two preceding years. It is now proposed to make a fresh issue of capital by the emission of a new loan of £1,500,000, which is required owing to the extension of business. The loans according to the previous balance-sheet amounted to £2,547,000, and the fresh issue will raise the total share and loan capital to about £10,500,000.

City Electric Light Co., Ltd. (Brisbane).

The directors' report for the half-year ended July 31st, 1911, states that after making additions to the reserve fund, dividend equalisation fund, franchise and purchase sinking fund, accident insurance fund and renewal replacement and contingencies account, there remains a credit balance of £4,954, which, with the balance brought forward from last half-year, makes a sum of £7,133 to be disposed of. It is recommended that a dividend be paid of 3 per cent. on the preference shares and of 5 per cent. on the fully-paid ordinary shares, and of 5 per cent. on the contributing shares in proportion to the amount paid up thereon. The directors also recommend the payment of a bonus of 1¼ per cent. on the fully-paid ordinary shares and of 1¼ per cent. on the contributing shares in proportion to the amount paid up thereon. The payment of the above-mentioned dividend and bonus, together with the dividend duty, will absorb £5,222, leaving a balance of £1,911 to be carried forward. Part of the plant for the new waterside power house in William Street has been delivered and erected, part also of the plant from Ann Street has been removed to William Street. This has enabled electricity to be generated and supplied from that station, thus freeing further plant in Ann Street which will be removed to William Street in due course. The meeting of the company was held on September 12th.

Ferranti, Ltd.

The directors report that, for the year to June 30th, 1911, the profit on trading was £49,074, and, after crediting discounts, interest and transfer fees, and deducting general establishment charges, repairs and renewals, legal expenses, bad debts, and directors' and trustees' fees, there remains a balance of £22,045, which has been applied as follows: Interest on prior lien debentures, £806; interest on first mortgage debenture stock, £5,000; interest on bank loan, £1,073; amount charged in respect of depreciation, £10,000; prior lien debentures redemption account, £1,000; leaving a balance of £4,166. The amount at credit at June 30th, 1910, was £1,162, making £5,327, which the directors recommend should be carried forward to the current year. The results for the year again show an improvement over those for the previous year. The depreciation allowance has been further increased from £7,500 to £10,000, and the amount of £1,000 has been charged against profits in respect of prior lien debentures redemption account.

Anglo-American Telegraph Co., Ltd.

An extraordinary general meeting of the shareholders of the above company was held on Monday at Winchester House, E.C., Mr. F. A. Bevan presiding.

The Chairman, in moving a resolution confirming the resolutions passed at the extraordinary general meeting on September 29th for leasing the company to the Western Union Telegraph Co., said that since they met, the shareholders of the Western Union Co. had held a meeting on the other side of the Atlantic, and had confirmed the agreement by a very large majority. A three-fifths majority was required, but out of 900,000 votes 770,000 or 780,000 were polled in favour of the agreement.

Sir Gerald Fitzgerald seconded the resolution, which was carried unanimously.

Mr. Channen said that subject, he supposed, to the sanction of the Court, the affairs of the company were now happily settled for 99 years; but there was one point on which he desired to invite the earnest consideration of the board. For years the company had had divided interests, which periodically arose between the preferred and the deferred shareholders, and it occurred to him that the present was an opportune time to get rid of those difficulties entirely. The deferred shareholders had the right to participate equally with the preferred in the capital assets in the event of liquidation. It was true that owing to the lease such a thing as liquidation was, they hoped and believed, shelved for all time—certainly for 99 years; and though the risk of dissension between the "A" and "B" shareholders was more remote than hitherto, he would like to see it entirely removed, and he thought it ought not to be a very difficult matter to give them one uniform stock. If they were to reduce the capital of seven millions down to £5,250,000, they would be able to give to each holder of £100 6 per cent. preference stock £120 of the new 5 per cent. guaranteed stock, and to each holder of £100 deferred stock £30 of the same stock. The security now was the lease and the guarantee of £262,500 which came in

annually. It took £210,000 to pay the "B," or the preferred interest, and the other £52,500 to pay 1½ per cent. on the deferred. If the lease was broken under the Sherman Act, the present preferences to the "B" stock would not be very much in case of default, because it was extremely unlikely that the default would stop short at the £210,000. He submitted that the deferred holders should have the same stock as the preferred, and they would then be conceding their chance of an equal distribution of assets in the event of liquidation. There was another point in favour of having a uniform stock. Originally they had one stock, and it was thought wise to give the holders an opportunity of splitting their holding into 6 per cent. preferred and deferred stock. The preferred stock holders got a preference over the deferred of 6 per cent., and the deferred stock holders took the reversion. Under this guarantee the deferred holder lost his right to his reversion because the amount of his interest was limited. It seemed, therefore, reasonable and right that the preferred holder should relinquish his claim to preference, and that the deferred holder should relinquish his claim to an equal distribution of the assets in the event of liquidation. He asked the board to complete their work by making all the shareholders equal, and so bury the bone of contention between them.

Mr. Fry said that speaking both as an ordinary and deferred shareholder, he suggested that they had better leave well alone. They were, he thought, going rather too quickly in asking the directors to immediately consider some scheme for altering their existing stocks. During the last 12 months the company had gone through very critical times, and he would suggest that at any rate they should leave matters where they stood for 12 months and see how the new lease worked.

The Chairman remarked that he was sure Mr. Channen would not expect him to at once give a definite opinion upon the proposal he had made. *Prima facie*, it seemed a very reasonable proposition, and one which he (the chairman) thought the directors should consider, but as Mr. Fry had said, the matter had come upon them unexpectedly, and naturally they must take some little time to consider it, especially as they must ascertain, if possible, what the wishes of the deferred shareholders would be—so very much depended upon them. They had equal rights with the preferred in case of liquidation, and it was rather a strong thing to ask them to give up that right. However, if the proposal could be carried through, personally, he thought it would be rather a desirable arrangement, but the shareholders might depend upon it that the board would not do anything in a hurry and without carefully considering the whole matter, and on a future occasion he would let them know how they entertained the proposal.

A vote of thanks to the chairman for presiding terminated the proceedings.

Direct United States Cable Co., Ltd.

An extraordinary general meeting of the shareholders of the above company was held on Tuesday at Winchester House, Old Broad Street, E.C., Mr. E. M. Underdown, K.C., presiding.

The Chairman, in proposing the confirmation of the resolutions adopted at the meeting held on September 29th for the purpose of leasing the company to the Western Union Telegraph Co., said he had no further information to give the shareholders than that which he gave them upon that occasion. He had only to add that the shareholders of the Western Union Co. in America, representing considerably over two-thirds of the capital stock of the company, had, by written consent, ratified and approved the agreement, and that the shareholders of the Anglo-American Telegraph Co. had also not only unanimously approved the agreement, but had confirmed their approval. He had no doubt that the views of the shareholders of the Direct United States Co. also remained unchanged, and that they would agree with the board that it was in the best interests of the company that they should confirm the resolutions for adopting the agreement, and making the amendments in the articles of association consequent thereon.

Sir James Pender, Bart., seconded the resolution.

Mr. Alldred said he understood the chairman at the last meeting to say that the board intended to pay quarterly dividends at the rate of 4 per cent., and that possibly at the end of the year the distribution might be made up to 5 per cent. He wished to know whether it was proposed to pay the dividends in future free of income-tax.

The Chairman replied that under the agreement they were restricted from paying more than a 5 per cent. dividend, and therefore they must always make their distributions subject to income-tax.

The resolution was then carried unanimously, and the proceedings terminated with a vote of thanks to the chairman and directors for the way in which they had conducted the negotiations for the lease.

Cuba Submarine Telegraph Co., Ltd.—The report for the half-year ended June 30th, 1911, states that the total receipts of the six months were £20,774, while the expenses amounted to £6,456, leaving a balance of £14,319, to which has been added £7,276 brought forward from last account, giving a total of £21,594 to be dealt with. The sum of £2,500 has been placed to reserve against loss on investments, and £4,000 added to the reserve fund, which now stands at £124,000. The dividend on the preference shares will absorb £3,000, and leave £12,094, out of which the directors recommend the payment of a dividend at the rate of 6 per cent. per annum on the ordinary shares, free from income-tax, the balance, £7,294, being carried forward. The cables continued in good working order throughout the half-year.

Stock Exchange Notices.—The Committee has (1) appointed special settling days as under :—

Monday, October 30th.—Rio de Janeiro Tramway, Light and Power Co, Ltd.—Further issue of 62,500 shares of $100 each.
Tuesday, October 31st.—Rio de Janeiro Tramway, Light and Power Co., Ltd.—Further issue of 62,500 shares of $100 each.
Thursday, November 2nd.—Rio de Janeiro Tramway, Light and Power Co., Ltd.—Further issue of 1,250 shares of $100 each.
Welsbach Light Co., Ltd.—262,000 shares of £1 each, fully paid (Nos. 1 to 262,000).
Friday, November 3rd.—Rio de Janeiro Tramway, Light and Power Co., Ltd.—Further issue of 23,750 shares of $100 each.

And (2) ordered the undermentioned securities to be quoted in the Official List :—

Rio de Janeiro Tramway, Light and Power Co., Ltd.—Further issue of 62,500 shares of $100; 62,500 shares of $100; 1,250 shares of $100; and 23,750 shares of $100 each.
Welsbach Light Co., Ltd.—262,000 shares of £1 each, fully paid (Nos. 1 to 262,000).

Application has been made to the Committee to allow the following securities to be quoted in the Official List :—

Sao Paulo Tramway, Light and Power Co., Ltd.—£800,000 5 per cent. perpetual consolidated debenture stock (renewed application).

Marconi's Wireless Telegraph Co., Ltd.—A circular issued to the shareholders states that a considerable development is taking place in all parts of the world in the use of wireless telegraphy, to which recent events are adding a further impetus. In order to be able to cope with the business in hand, and to be able to take full advantage of pending negotiations of an important nature, the directors have resolved to call extraordinary general meetings for October 25th and November 9th, for the purpose of passing a special resolution to increase the company's capital by 250,000 £1 ordinary shares. These will be issued on such terms and conditions as the directors think fit, such shares to rank *pari passu* in all respects with the existing 500,000 ordinary shares of £1 each.

The *Financial News* states that the Marconi Co. has secured the control, and will in future direct, the management of the Russian Co. of Wireless Telegraphy and Telephony of St. Petersburg. Mr. Adrian Simpson, of the Marconi Co. of London, has been appointed managing director, and is about to proceed to St. Petersburg to assume control. Russian Government contracts for wireless telegraphy provide that all material to be supplied shall be manufactured in Russia. In these conditions the Russian Co. of Wireless Telegraphy and Telephony secures the bulk of all the Russian Government business, which is very considerable. The company has very large orders in hand and considerable business in prospect. Under the agreements entered into the Russian company obtains a licence for the Marconi patents for Russia.

Cape Electric Tramways Co., Ltd.—The directors' report for the year ended June 30th, 1911, as abstracted in the *Times*, states that the profit, after providing for debenture interest and redemption of debentures, and taking into account the balance brought forward, amounts to £28,855. From this sum the reserve fund has been credited with £8,000, leaving £20,855. It is proposed to recommend a dividend on account of the earnings for the past year of 2½ per cent., tax free, on the ordinary shares. This will absorb £12,281, and the balance of £8,574 it is proposed to carry forward. During the past year the tramways carried in Cape Town 13,318,110 passengers, the receipts being £131,702, as against 12,207,739 passengers, with receipts of £119,936, for the year 1909-10. In Port Elizabeth 3,363,099 passengers were carried, the receipts being £35,632, against 3,102,286 and £32,883 respectively for 1909-10. The improved conditions of general business which were manifested last year have continued, and there is every reason to look forward to further improvement in this direction.

Direct United States Cable Co., Ltd.—The board announces an interim dividend of 2s. per share, together with a bonus of 6d. per share, less] income-tax, being at the rate of 5 per cent. per annum for the quarter ending September 30th.

Brisbane Electric Tramways Investment, Ltd.—The directors have declared an interim dividend at the rate of 8 per cent. per annum, free of income-tax, on the ordinary shares for the past half-year.

Montreal Light, Heat and Power Co.—The directors have declared a dividend of 2 per cent. on the paid-up capital stock (being at the rate of 8 per cent. per annum) for the quarter ending the 31st inst.

Anglo-Portuguese Telephone Co., Ltd.—The directors announce an interim dividend at the rate of 3 per cent., free of income-tax, on account of the year ending December 31st, 1911.

Anglo-Argentine Tramways Co., Ltd.—The directors recommend an interim dividend of 4s. per share, being at the rate of 8 per cent. per annum, less income-tax, on the £2,500,000 ordinary share capital for the half-year ended June 30th, 1911.

Stothert & Pitt, Ltd.—On page 577 of our issue of October 6th we printed the dividend on the ordinary shares in this company incorrectly. We should have stated it as 5 per cent., not 3 per cent. per annum.

(*Continued on page* 670.)

SUPPLEMENT.

SOME OF THE EXHIBITS AT OLYMPIA.—V.

(The figures in parentheses are the numbers of the stands.)

The Coventry Chain Co., Ltd. (251),

Spon End, Coventry.

The general principles and advantages of the "Coventry" chain gearing are too well known to need repetition. A number of thin, hard steel, toothed links, provided with dead hard bushes, are pinned together to form a flexible, internally toothed band of width depending on the running speed and power transmitted (see fig. 228). The teeth are so designed as always to mesh perfectly with the gear wheels connected by the chain. Standard pitches up to 2½ in. are now available, and a linear velocity of 1,400 ft. per min. may be attained. The present exhibit includes various examples and illustrations of the application of "Coventry" chains. A two-stage speed reduction box is shown with the cover removed; the chain runs in oil, and an overall efficiency shaft to shaft of 98 per cent. is guaranteed. Up to 5½/1 speed reduction can be effected per pair of gear wheels, and the makers supply a four-stage gear box giving 80/1 speed ratio between the initial and final shafts. Visitors should carefully inspect the 32/1 reduction box exhibited as applied to the starting of large motors, &c. (a pawl release gear uncoupling the starter at a predetermined speed). The "Coventry" shock fluctuating drive, and not only smooth out the varying torque, but also reduce the shocks on the driving chain.

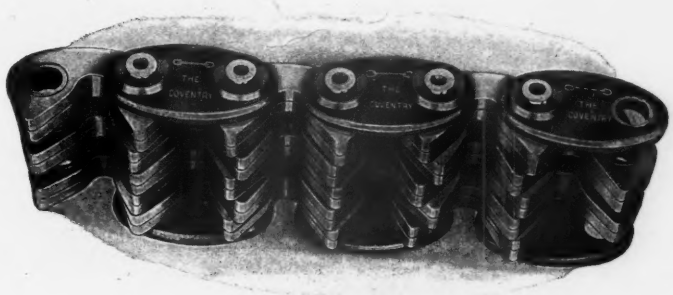


Fig. 228.—Coventry Chain.

The Felt and Tarrant Manufacturing Co. (299),

Kingsway, W.C.

The scope and simplicity of the "Comptometer" calculating machine must be seen to be appreciated. This instrument is already widely used by a great variety of British trading and manufacturing firms; its manipulation consists in the successive depression of one or more, at a time, of the bank of keys according to very simple rules. The result of the calculation is indicated along the front of the machine; no paper or ribbon, &c., is required. The total weight of the machine is 15 lb. The machine adds, subtracts, multiplies and divides any quantities occurring in finance, trading or manufacture. The most sceptical observer cannot but be impressed by the convenience and speed of the "Comptometer"; as a single instance of its results—7 cwt. 1 qr. 4 lb. at 16s. 9d. per cwt. = £6 2s. 0½d., in *three seconds*.

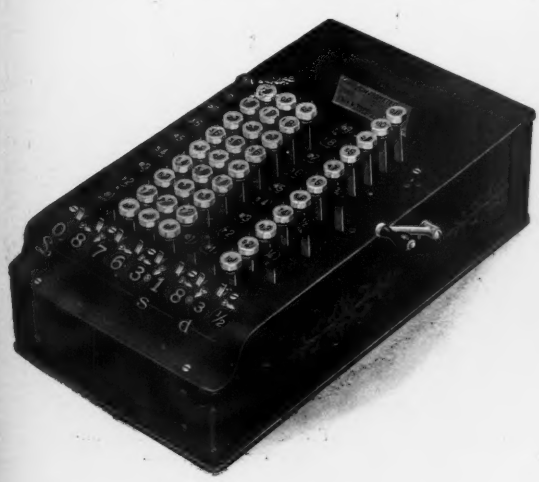


Fig. 229.—The "Comptometer."

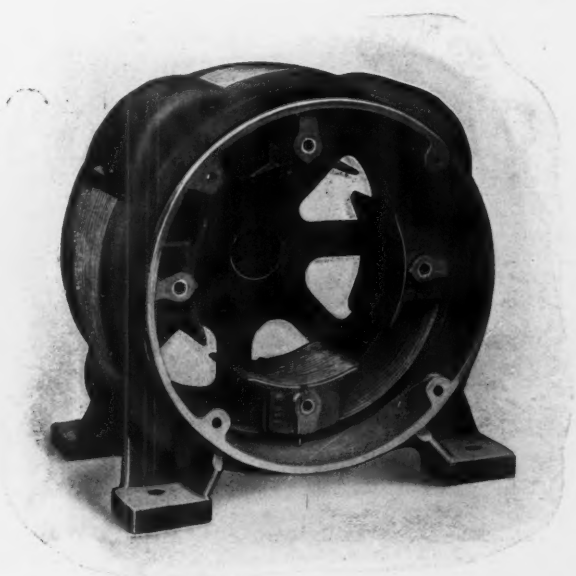


Fig. 230.—Carcass of "J.-L." Motor.

absorption wheel consists of an inner hub, keyed to the driving or driven shaft, and an outer chain wheel connected to the inner boss through suitable helical springs; these wheels are applicable to any

The J.-L. Manufacturing Co. and Gwynnes, Ltd.,

Southall and Hammersmith.

The J.-L. Co. are exhibiting interesting examples of their laminated field motors, special features of which are the laminated yoke field circuit (see fig. 230, page 655), the double carbon brush-holder, and the lightness and compactness of the design as a whole (30 per cent. saving in copper weight is claimed). The machines have low temperature rise, high efficiency and overload capacity, wide speed range by field control, and sparkless commutation up to 50 per cent. overload, without the use of interpoles or other commutating devices. Various housings from "open" to "weather-proof" types are supplied, and fan ventilation is fitted when necessary.

The now familiar Macdonald submersible motor is shown in submersed operation at this stand. For full particulars of this machine we may refer readers to our issue of March 24th, 1911. It will be remembered that the motor is of the squirrel-cage induction type, the stator winding being perfectly waterproof, and the rotor bars being bare, but offering between no two points a greater P.D. than 1·5 volts (so that no electrolysis of the water occurs). Heating, naturally, offers no difficulties in this type of motor, the many applications of which will at once occur to readers.

Messrs. Alexander Wright & Co., Ltd. (237),

Westminster.

This exhibit is of considerable scientific interest, including as it does a National Physical Laboratory standard photometer, provided with a bench and scale designed by Simmance & Abady to N.P.L.

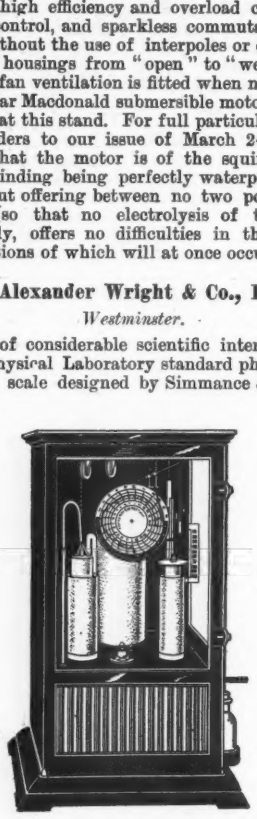


FIG. 231.—SIMMANCE-ABADY CO_2 RECORDER.

requirements, and the lamp rotator designed by Mr. C. C. Paterson, of the N.P.L.; Simmance-Abady direct-reading portable photometers for street tests, &c.; a variety of recorders for combustion, draught, pressure and vacuum; recording water-meters, also calorimeters and thermometers—the stand being, in fact, illustrative of the scientific methods which the central-station engineer may and ought to adopt with a view to obtaining the best results from the installations under his control.

Of the numerous interesting items, we single out for reference the Roland Wild calorimeter, shown in fig. 232, consisting of a combustion chamber (in which the fuel sample and sodium peroxide are placed), suspended from the cover by a conduit, which is furnished with a valve. A copper water vessel is provided inside an outer vessel, heavily nickelled, forming an air jacket, which prevents radiation and absorption and renders the temperature rise of the water a true guide to the heat given off by the fuel. A suitable thermometer and a stirrer are also provided. Ignition is obtained by introducing a small piece of nickel wire, heated to redness, into the crucible, through the valve in the conduit, but means for electrical ignition and mechanical stirring can be fitted. The apparatus is an up-to-date low-pressure bomb calorimeter, suitable for rapid testing, and giving results within 1 per cent. of accuracy.

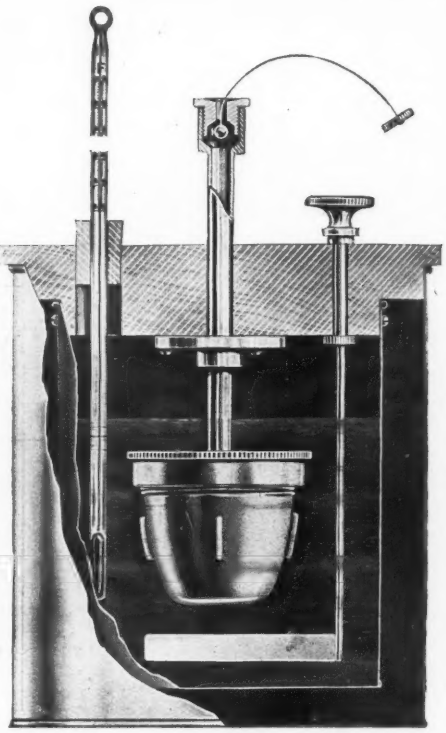


FIG. 232.—ROLAND WILD CALORIMETER.

The Simmance-Abady CO_2 recorder, with a disk chart, shown in fig. 231, is of course familiar to many engineers, both in this country and abroad. This apparatus is supplied with either 24-hour disk

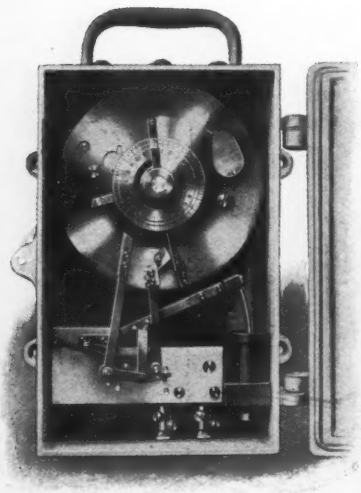


FIG. 233.—"B" TYPE VENNER TIME SWITCH.

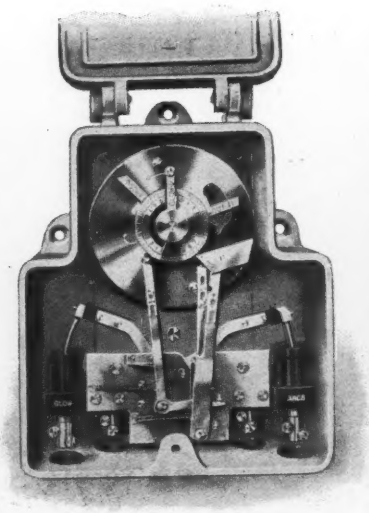


FIG. 234.—"DB" TYPE VENNER TIME SWITCH.

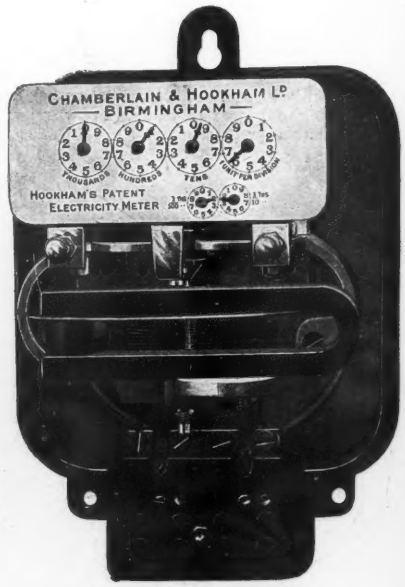


FIG. 235.—HOOKHAM SINGLE-PHASE METER.

or drum charts, or a 60-day roll similar to a tape machine, and combined with a draught recorder.

A new "Precision" water meter is shown, for which great simplicity and accuracy are claimed. As regards the latter usually debatable attribute of water meters, we understand that a National Physical Laboratory test showed an error of less than 1 per cent. The meter is fitted with the "Yorke" weir, the flow of liquid over which enables the rate per hour to be ascertained—the mechanism for recording this automatically, consisting of a float, with clock-driven drum and charts. Various capacity meters are obtainable, from 30,000 lb. to 300,000 lb. per hour, and owing to the absence of working parts, the maintenance costs are negligible.

Messrs. Venner & Co. (156, 157),

6, Old Queen Street, S.W.

Messrs. Venner's exhibit makes up in interest what it lacks in variety. Most attractive to the average exhibition tourist would be, no doubt, the series of Credenda picture signs inside the room which is provided on this stand.

These are in daylight-coloured pictures—actually copies of some of the artistic posters which have been introduced by our railways—outlined with numerous small glass balls, on the Venner patent principle, which has been described in our pages. When illuminated from behind at night by a few glow lamps, brilliant outlines are obtained, giving a most attractive effect to what would ordinarily be in darkness.

The flexibility of this system is demonstrated by a sign showing an orang outang in skeleton form; minute beads can be used, and thus the smallest detail can be emphasised.

Turning from signs to switches, the range of Venner time switches will attract the central station engineer, as also a simple current limiter and some motor-driven flashers for illuminated sign work; as regards the latter, a special quick-break switch is provided, with a view to obtaining efficient working.

We illustrate in figs. 233 and 234 the B type time switch for controlling two-rate meters, street and staircase lighting, &c., and the D B type for combined arc and incandescent street lighting. The former is for use where the current does not exceed 1½ amperes at 250 volts; it is fitted with a well made clock and simple switch which will close the circuit for any time from 15 mins. to 21 hours. Platinum contacts are employed, and selective switching can be arranged.

The D B type is for changing over 250-volt circuits carrying up to 15 amperes on the first circuit and 5 amperes on the second, with D.C., or double this amount with A.C.

Of course, Messrs. Venner make a great variety of these switches for all purposes, and one feature of the exhibit is a "restricted hour supply" time-switch for up to 300 amperes at 500 volts. Turning from switches to meters, a selection of the well-known Chamberlain and Hookham standard A.C. and D.C. instruments are shown.

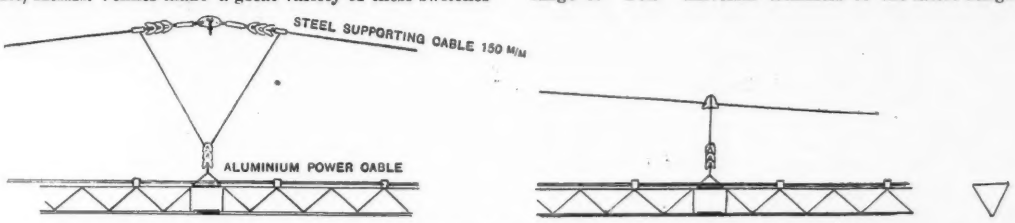


Fig. 238.—Paul Semi-Rigid Contact Line for Single-Phase Traction; Laing, Wharton's Exhibit.

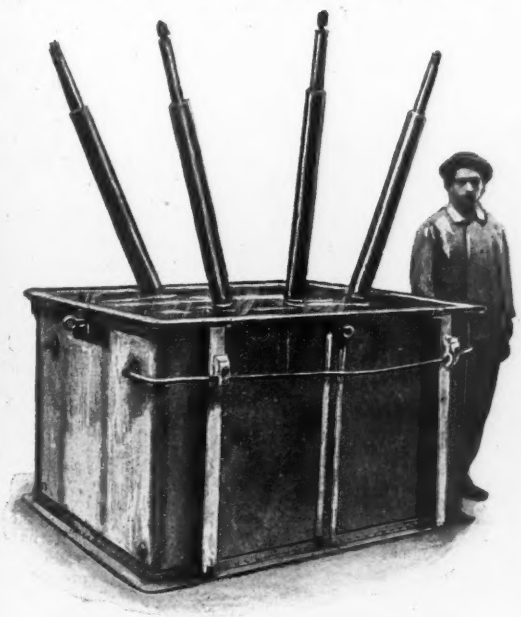


Fig. 239.—100,000-volt Testing Transformer; Laing, Wharton's Exhibit.

These cover a wide field of usefulness, and include both watt-hour and ampere-hour D.C. meters, also tramcar meters; attachments for the two-rate system of charging, and the Lackie maximum demand indicator in combination with the firm's meters; also prepayment meters for either 1s. or 1d. in the slot, or for foreign currency. We illustrate in fig. 235 a Hookham single-phase meter of the induction motor type for currents up to 100 amperes, pressures up to 600 volts, and frequencies of 25 to 125 cycles per sec. We should mention that the firms exhibiting are Venner Time Switches, Ltd., the Credenda Signs Co., of Birmingham, and Messrs. Chamberlain & Hookham, Ltd., of Birmingham, for all of whom Messrs. Venner & Co., are the agents.

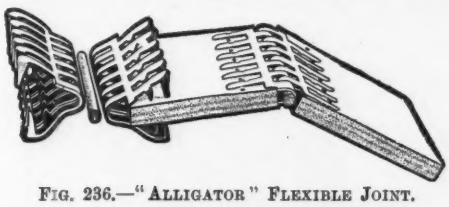


Fig. 236.—"Alligator" Flexible Joint.

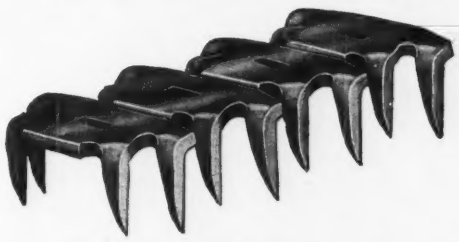


Fig. 237.—"Turtle" Belt-Fastener.

Messrs. J. B. Stone & Co. (230),

135, Finsbury Pavement, E.C.

This firm are showing a collection of their special tools and machinery of interest to the electrical and kindred trades. A full range of "Fox" universal trimmers of the latest design, some of the self-contained type mounted on their own standards, others being compact for screwing to a joiner's bench; these embody a number of improvements. A special feature on the stand is the belt-fastener exhibit. The original "Peerless" belt-lacing machines were followed by the flexible steel lacing with a pinless hinge, and now, last of all, the firm have introduced the patent "Alligator" flexible and detachable steel lacing (fig. 236). The "Alligator" joint ensures quick contact with the pulley, whether the belt is run with either or both sides in service, and as the lacing engages both sides of the belt alike, the strain is thrown in a direct line with the pull, making a joint which is easy on the belt, and which, applied according to directions, will stand any strain put on a belt under any conditions of drive. For both the flexible and "Alligator" steel lacing no sort of equipment is requisite. The "Turtle" belt-fastener (fig. 237) is perhaps more simple to handle than either the flexible or the "Alligator," and has particular advantages to the practical man. Messrs. J. B. Stone & Co. have tried to satisfy by demonstration all opinions in respect of the vexed question of belt fastening. They are also showing their "Stephenson's" bar belt dressing; their easy car pushers, which will work on any track; tally meters (a measuring instrument primarily, perhaps, designed for indicating at a glance the output from planing machines, but applicable to a variety of purposes); the swing cut-off saw gauge, for securing absolute adjustment of the timber on the saw table, thus avoiding waste. Other special lines are their band saw filer, and the "Universal" ratchet.

Messrs. Laing, Wharton, Ltd. (56, 67),

7, Great Newport Street, W.C.

In an earlier notice of Messrs. Laing, Wharton's exhibit, when it was incomplete, we referred to the 100,000-volt testing transformer, which has since been erected over the stand and now provides a popular attraction for the passer-by when its crackling discharges are in progress.

The transformer, shown in fig. 239, weighs 1½ tons, and contains 1½ tons of oil; it is of 50-KW. capacity and is intended for testing high-voltage transformers. On the stand it is arranged to discharge at 50,000 volts over two bottle insulators to an earth plate, and is supplied on the L.T. side with 220-volt 50-period single-phase

current through an oil circuit-breaker, and an ordinary S.P. circuit-breaker and fuses (in a locked case) in series.

An exhibit of considerable interest to the railway man is a section of the Paul patent semi-rigid aerial conductor, shown in fig. 238, which is built up of half-round iron sections with a lower steel contact strip and an aluminium power cable over the triangular

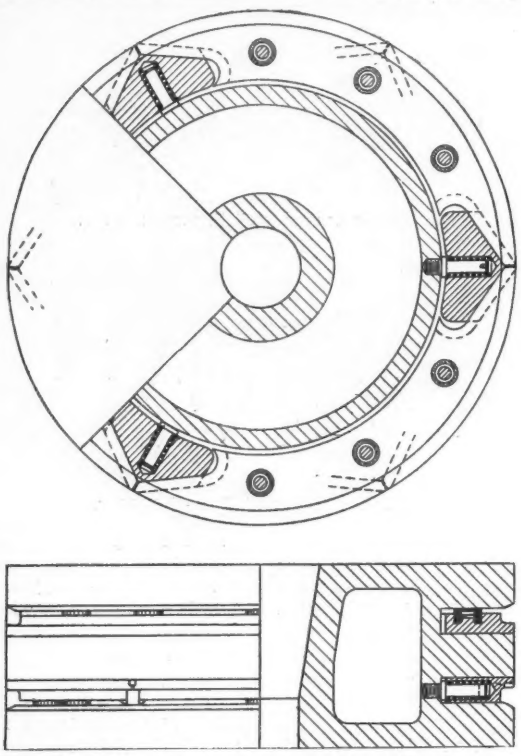


FIG. 240.—PISTON FITTED WITH THE ALLEN FRICTIONLESS RINGS.

construction. The latter is built up in lengths with special joints between them which allow for end movement due to temperature, &c., and suspended by a steel carrying cable suitably insulated. This is one of six experimental systems now under trial on the Midi Railway of France, as a preliminary to electrification with single-phase current at 12,000 volts. Overhead collecting gear for the same line is shown, and a new patent acetylene welding system for welding copper bonds to steel rails *in situ*. This system is considerably cheaper than any other yet introduced; two men can weld six bonds per hour without interfering in any way with traffic, and a specimen bond is on view at the stand.

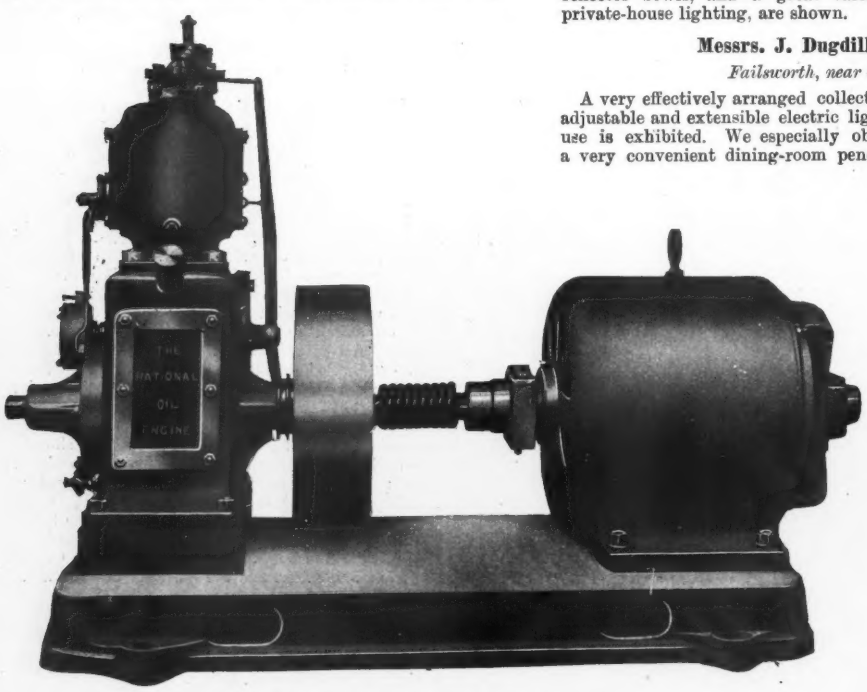


FIG. 241.—"RATIONAL" OIL ENGINE AND DYNAMO.

Another novelty which has been added within the last last few days is the Arnold patent time switch with double contacts. This has been specially designed for street lighting work, as, for instance, switching lamps on at dusk and switching a proportion out at midnight, and the remainder at dawn. The switch is simply made, only one spring being included in its construction.

Messrs. Allen & Simmonds, Ltd. (229),

Reading.

The feature of this exhibit is the Allen patent frictionless piston ring, the arrangement of which can be better understood by reference to fig. 240.

A piston fitted with two rings is shown; each ring is divided into three segments, and a spring-controlled block at each joint forces the rings outwards against the cylinder walls. The upper and lower rings break joint as shown by the dotted lines. It will be noted that the rings are of special section, and that steam passes freely along one side and behind the rings; the object of this arrangement is to secure a steam-tight joint on one side of each piston ring, and to give the rings a floating action controlled only by the springs behind the joints.

We understand that these rings have been widely tested in both marine and land engines, including gas engines, and have given great satisfaction.

In the case of a Belliss compound engine at the Chester Corporation electricity works which was fitted with the Allen rings, a recent test showed a saving of 14 per cent. in the steam consumption, as compared with two years previously when the engine was working with the ordinary piston rings fitted by the builders.

The Heatly-Gresham Engineering Co., Ltd. (175),

Gresham Iron Works, Letchworth.

On this stand are shown a number of the "Rational" patent oil engines, most of them direct coupled to Mawdsley or Siemens dynamos, and ranging from 3 to 6 B.H.P.; two of these are of the vertical and two of the horizontal type, besides a vertical engine driving a Worthington pump. We illustrate in fig. 241 one of the electric generating sets with vertical engine; the latter has the advantages of extreme simplicity and accessibility; the piston, connecting rod and cam shaft can all be removed without taking off the cylinder, and the governing is very simple and sensitive. The firm's own patent vaporiser is used, which causes no deposit in the cylinder or gumming of the piston rings, and these engines can be run continuously on electric ignition without attention. The engine can be started on paraffin, without petrol, the lubrication is automatic, and the oil consumption is stated to be 0·85 to 0·9 pint per B.H.P.-hour.

Messrs. Holophane, Ltd. (199, 216),

12, *Carteret Street, S.W.*

The company makes a good display of the well-known Holophane glassware, the shades being adapted for various distributions as required by the user. Attractive-looking Holophane spheres and reflector bowls, and a great variety of smaller reflectors for private-house lighting, are shown.

Messrs. J. Dugdill & Co. (238),

Failsworth, near Manchester.

A very effectively arranged collection of the firm's well-known adjustable and extensible electric light fittings for many classes of use is exhibited. We especially observed a mirror light fitting, a very convenient dining-room pendant, and various desk, table and piano standards, which can be put into almost any position. A new and special feature is an application of the system to picture lighting, which has been shown during the past week or so.

Haydn Harrison

(309),

11, *Victoria Street, S.W.*

Mr. Haydn Harrison has confined his exhibits to the latest developments in connection with his street lighting business, the present magnitude of which is evidenced by the imposing list of towns in which he has carried out the conversion of gas to electric street lamps. The graceful tungsten lanterns employed, instead of gas or in place of arc lamps, are very noticeable (fig. 243); by the careful placing of the lamps beneath a specially designed enamelled reflector, the excellent efficiency of 1·5 effective C.P. per watt is secured. Over 900 arc lamps have already been replaced by these fittings. With reference to side street and other branches of exterior lighting, Mr. Harrison is exhibiting special lantern and reflector designs which have been widely adopted.

The Johnson-Billington A.C. watt-hour meters (fig. 242) shown are of an entirely new type, in which permanent braking magnets, and the ageing errors attributable to the latter, are avoided by the use of A.C. electromagnets. These meters start on 2 or 3 watts load (5A size), and their characteristic curve is linear from $\frac{1}{100}$ full load upwards on both inductive and non-inductive circuits; at full loads

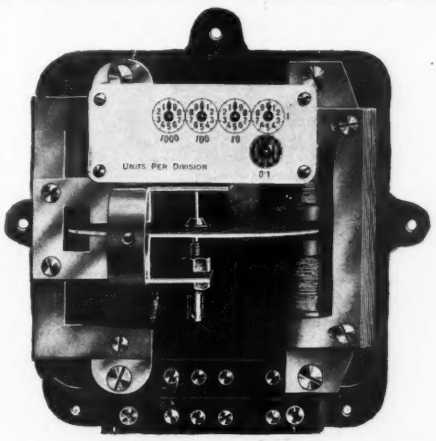


Fig. 242.—Johnson-Billington A.C. Watt-hour Meter.

the armature speed is exceptionally low. The winding of the brake magnet is in series with the shunt field coils, and perfect temperature correction is claimed.

There are many other interesting features in this exhibit, such as time switches, automatically changing the operating period in

Fig. 243.—Harrison Tungsten Lamp Fitting.

accordance with the season, automatic "half-night" switches, automatic control switches for series-parallel groups of tungsten lanterns, and circuit-breakers with inverse thermal time-limit release.

Messrs. W. T. Nicholson & Clipper Co., Ltd. (234),

King Street, Salford.

This exhibit has as its outstanding feature the "Klincha" tool and patent belt-fasteners; the "Clipper" belt tools and hooks are also shown.

Messrs. Wallach Bros., Ltd. (28, 33),

Royal London House, Finsbury Square, E.C.

A feature which has excited a good deal of interest at this stand has been a line of high-speed portable electric drilling machines for attaching to existing lighting circuits, and many orders for these have been booked during the Exhibition. The windings of the machines are such that speed regulation is obtained according to the size of drill used. The special construction of the motors obviates

Fig. 244.—The "Daisy" Vacuum Cleaner.

the necessity for overload cut-out—that is, if the drill stops dead in going through a hole, no immediate burning-out of the motor occurs.

Another very popular line on this stand is the "Daisy" electrically driven vacuum cleaner. Models for domestic service fitted to lamp sockets in private houses are supplied, weighing 90 lb., and measuring 32 in. high × 16 in. deep × 18 in. wide. A large size (model "E"), which we illustrate, fig. 244, is specially intended for service in hotels, factories or warehouses. It weighs 119 lb. and measures 36 in. × 16 in. deep × 20 in. wide. A third line to which attention may be called is a new asbestos-packed cock, which can be repacked whilst the boiler is under steam. Many other of the firm's well-known manufactures, such as engineering tools and sundries, are, of course, exhibited, india-rubber gloves being included among them.

Messrs. Escaré & Denelle, Ltd. (145, 166),

129, *Wardour Steeet, London, W.*

There are a number of excellent displays of electric light fittings in the Exhibition building, but that of Messrs. Escaré & Denelle fastens the visitor's attention first by the fact that workshop

Fig. 245.—Georgian Candle Bracket.

operations are demonstrated in actual progress. Several of the firm's expert metal workers are engaged in embellishing brass work from the casting. "Live" exhibits always compel the interest of the average mortal. This stand is not only alive in the sense that

we have mentioned, but the fittings and objects shown are themselves quite eloquent in the appeal made by their artistic qualities. The high-class character of the exhibit may be gathered when it is

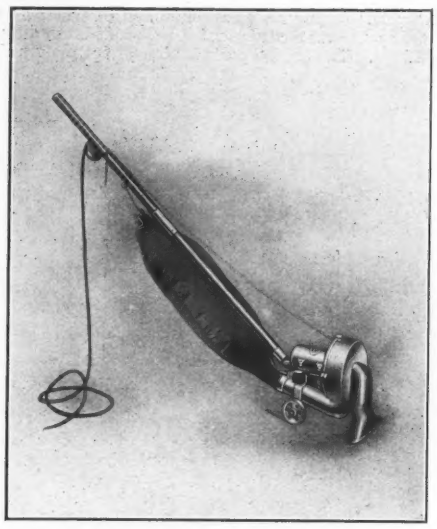
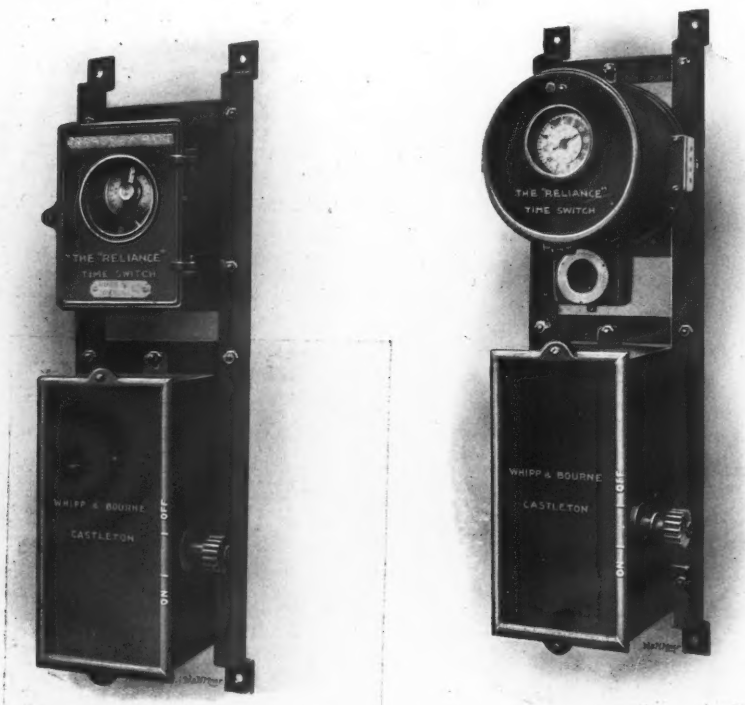


FIG. 246.—THE "MAGIC" SUCTION CLEANER.

mentioned that there are displayed some fine reproductions made in oxidised silver and gilt for the Government authorities for Holyrood Palace, also an example of fittings made for King George's dressing room at Buckingham Palace. Among other features brought to our notice was a new system of picture lighting which, by a particular arrangement of lenses, obviates streaky rays and also increases the illuminating effect so that the light extends right to the bottom of the picture. The illustration shown in fig. 245 represents a rich Georgian wall light of registered design. Messrs. Escaré & Denelle, of course, specialise also in bell and switch plates and general metal work in all styles, as well as in carved wood fittings.



FIGS. 248 AND 249.—"RELIANCE" TIME SWITCHES: WHIPP & BOURNE'S EXHIBIT.

Magic Appliances, Ltd. (17, 44),
6, *Farringdon Avenue, E.C.*

This exhibit consists of the "Magic" suction cleaner, which is made at Witton, near Birmingham, and is an extremely neat and handy device. As shown in the illustration above, fig. 246, it is of the portable self-contained type, and is operated by a connection to an ordinary lampholder or wall-socket; it is made for D.C. and A.C. circuits of all voltages from 100 to 250 volts, and is very small and light, weighing less than 10 lb. The case is of aluminium, and contains four members—the suction intake, the fan box, the motor and the exhaust duct; the motor is mounted horizontally, with provision for self-lubrication, and drives a disk turbine fan giving an air-current of large volume. The case is carried on rubber-tired wheels with ball bearings, and the handle is pivoted, so that the machine always maintains the proper position without effort on

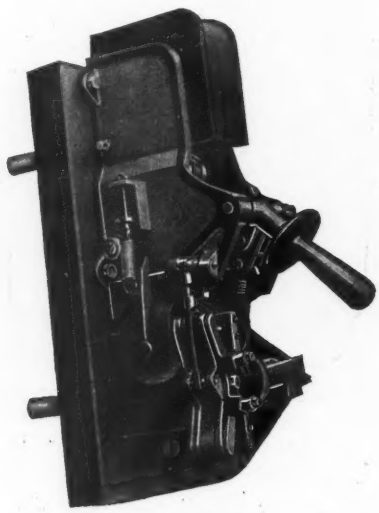


FIG. 247.—WHIPP & BOURNE'S REVERSE-CURRENT CIRCUIT BREAKER.

the part of the operator. The dust bag offers a large filtering surface, retaining all dust, while allowing the air to escape freely. A switch on the handle controls the motor, and the flexible cord has a plug connection at the motor end as well as at the other end. A variety of attachments, to enable the cleaner to be used in all situations, including extension hose and handle for cleaning walls, cornices, &c., and for utilising the machine as a blower instead of an exhauster, is provided with the cleaner. Judging from the interest displayed in the device by the cluster of visitors round the stand, the cleaner is likely to become a popular item of the domestic *ménage*.

Messrs. Whipp & Bourne (183),
Castleton, Lancs.

The switch productions of Messrs. Whipp & Bourne are probably not so well known as they deserve to be, in view of the excellent features which are embodied in their construction generally.

The exhibit includes a great variety of switches, fuses, resistances, &c., and of particular interest to engineers who are developing a "restricted hour" supply are the "Reliance" time-switch arrangements of this firm, consisting of either a pendulum or lever escapment clock, in conjunction with an enclosed loose handle switch—the function of the time switch being solely to make a shunt circuit to open the main switch. The clock switch does not break any circuit, and this eliminates contact trouble. We illustrate in figs. 248 & 249 switches of the lever escapement and pendulum escapement types respectively, and these are made standard for capacities between 10 and 200 amperes for 440 volts. The switches can also be combined with overload loose handle circuit-breakers. Fig. 247 is one of the firm's overload and reverse-current circuit-breakers of the "loose handle" and magnetic blow-out type, constructed in standard sizes between 25 and 2,500 amperes, examples of which can be seen in operation on the stand. In connection with the time limit a calibration scale is provided, varying from 5 seconds to 5 minutes, and should the limit period not be used, the switch will reset itself, giving the full time again.

The feature of the reverse-current breaker, however, is its ability to operate with a reduced bus-bar pressure. Even if the pressure is reduced to only 5 per cent. of normal, the current will only be

one-third full load current of the breaker. It is impossible for the reverse breaker to open circuit with an overload or short-circuit in the forward direction. The power operating the reverse-current trip increases as the current rises in the reverse direction, and as the trip is electrical, no resetting is required after operation.

These circuit-breakers are supplied with all the usual operating devices, and a typical Admiralty D.P. breaker interlocked with an equalising switch is shown on the stand.

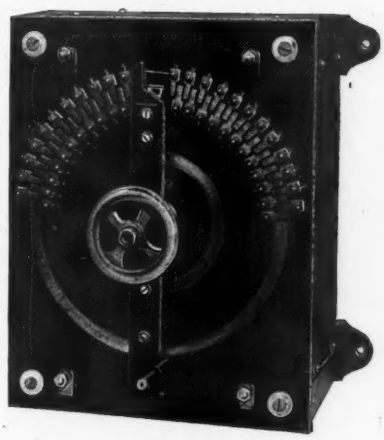


Fig. 250.—"Reliance" Rheostat.

The firm specialises in electrically-controlled switchgear, and examples of its remote-controlled circuit-breakers for motors, generators, &c., and built-up control units are on view.

These, it may be added, are of metal and mica construction throughout, in sheet-steel waterproof cases, and have, in one form or other, been used in practically all our latest battleships. Another feature of the exhibit is the "Reliance" rheostat for switchboard work, as illustrated in fig. 250, for dynamo voltage and motor speed control.

The resistances consist of Eureka wire wound on asbestos-covered steel tubes carried in porcelain blocks; the contact connections are protected by porcelain beads. The contacts vary in number from 20 on the 300-watt size to 40 on sizes above 2,000 watts capacity.

Messrs. Pinchin, Johnson & Co., Ltd., (155),

26, Bevis Marks, E.C.

On this stand is shown a practical illustration of the uses of the Standard insulating varnishes and compounds. Examples of armature and field coils are shown, loaned or supplied by customers of the firm.

Special attention is called to the use of the Standard insulating varnishes and compounds in connection with the maintenance and repair of electrical machinery. The windings of machines periodically coated with a suitable varnish will be kept in a constant state of efficiency, any fear of breakdown through

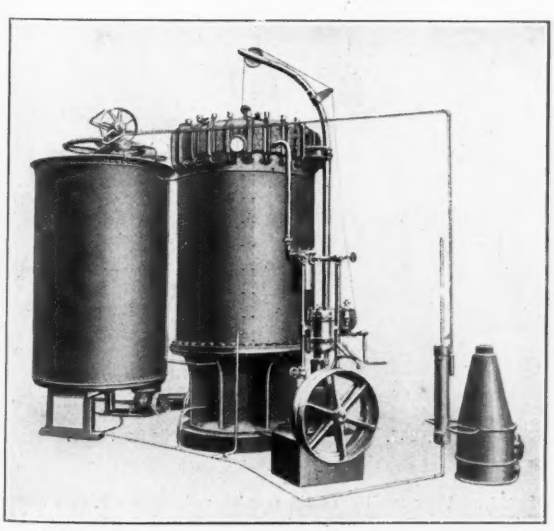


Fig. 251.—Impregnating Plant, with Pump and Compressor.

the penetration of moisture or lubricating oil being reduced to a minimum. Another interesting feature of the exhibit is the vacuum drying and impregnating apparatus, which is shown on the stand. By means of this plant the windings of electrical machinery can be treated under vacuum, and subsequently under pressure, with compound or varnish, ensuring complete elimination of moisture and thorough waterproofing of the windings. We illustrate in fig. 251 a complete dry insulating plant, 5 ft. diameter × 8 ft. deep, for both solid compound and liquid varnishes, with vacuum pump and air compressor and steam heater to work at 200 lb. pressure.

Messrs. Schäffer & Budenberg, Ltd. (21, 40),

77A, Queen Victoria Street, London, E.C.

This firm has a large exhibit of its well-known pressure and vacuum gauges and other instruments, covering a wide range of measurements, as well as boiler fittings of all kinds. An electrical distance thermometer of the resistance type, with direct-reading dial, and a switchboard enabling any number of stations to be connected and rapidly tested, is shown, and the Bayer patent steam meter, which records on a chart the weight of steam per second passing through a pipe, as well as the pressure in the pipe at each instant, forms another interesting item. The Bayer meter consists essentially of a disk suspended in a conical passage, so designed that the disk always moves to a position where the difference of pressures above and below it balances a constant force due to a counterweight; the velocity of the steam passing the disk is thus maintained constant by increasing the area of the annular space surrounding the disk, and under this condition the weight of steam per second at constant pressure is proportional to the area of the opening. The pressure chart enables the user to apply the necessary corrections for changes in the steam pressure.

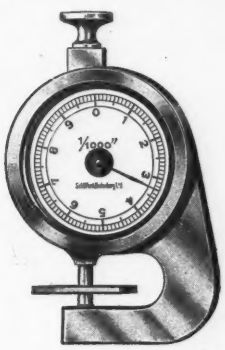


Fig. 252.—"Auto" Caliper.

A series of automatic micrometer calipers, which give direct readings on a dial, is worthy of notice; these are made for a variety of purposes, and for various ranges. We illustrate (fig. 252) one graduated in $\frac{1}{1000}$ in. and intended for indicating the thickness of paper, sheet metal, &c. The jaws are normally held apart by a spring; the substance to be measured is placed between them and the plunger pressed down, when the reading is at once given on the dial, and as the instrument can be used with one hand, it is much more convenient to manipulate than the screw type.

Dowsing Radiant Heat Co., Ltd. (161).

105, Great Portland Street, W.

The Dowsing exhibit undoubtedly does the firm credit. It makes its appeal to several distinct classes; to the ladies who want a substantial and serviceable line of electric stove or other cooking

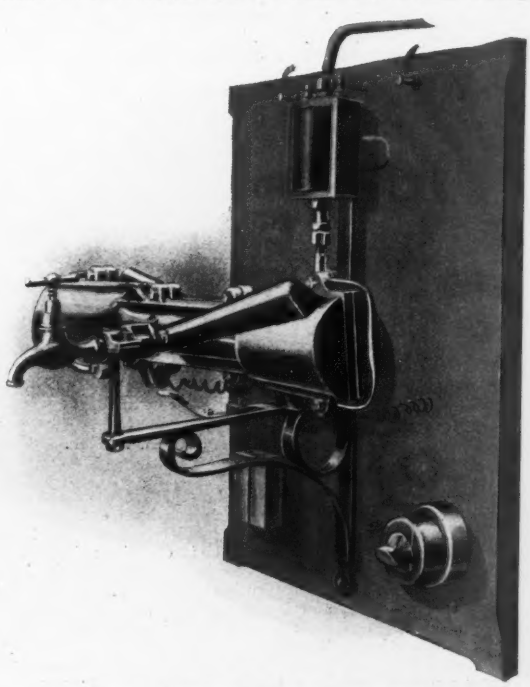


Fig. 253.—"Nogier" Water Steriliser.

device; to the Mary Anns or Sarahs who are troubled with household work, and to the mistresses who are troubled by them; also to the medical men of London, amongst whom a further interest has been stimulated in the medical applications of electricity.

Even here the variety of the appeal does not end, for the deputations from public authorities will not have failed to take special note of the plant shown for the sterilisation of water supply. Taking the stand, then, in the order indicated above—we find, first, a useful display of three heat electric cookers, and "Kensington" electric ranges, concerning which we may be able to say more in a later issue. Then we have, of course, kettles, irons, and general electric heating and cooking apparatus. The radiator in its various designs of luminous and combined luminous and convector patterns is strongly and warmly in evidence, while the maid-of-all-work reclines in leisure in the enjoyment of a grateless, ashless, smoke-free existence, with half her occupation gone.

The familiar "Solarium," or electric sun bath—a small one in folding oak with enamelled iron lining for home use; the hair dryer and the vibrator; and the seven-purposes-in-one "Multostat" which has been appreciated by medical men as a most serviceable line—all these lead us down to the "Nogier" equipment for the sterilisation of water by ultra-violet rays. Two or three years ago Drs. Courmont and Nogier, in a communication to the French Academy of Sciences, showed that water, however impure bacteriologically, could be thoroughly sterilised by the ultra-violet rays given out by a mercury quartz lamp, provided that the water was not muddy or thick. In the "Nogier" steriliser it has been demonstrated that the microbe-spores themselves are completely destroyed. The water undergoes no chemical change, and it contains neither ozone nor oxygenated water, nor any added substance, the sterilisation being purely physical. The apparatus exhibited (fig. 253, p. 661) is for household purposes, and is composed of a metallic covering in bronze, nickelled inside and out, in which is placed a mercury-vapour quartz lamp. The yield of the household apparatus amounts to 220 to 330 gallons per hour. If the apparatus be used by surgeons, who especially require sterilised water for operation purposes, the delivery of water can be specially regulated.

The apparatus is supplied mounted on a marble slab which can be fixed to the wall by screws, and it carries a connecting joint for the inlet of water and terminals to which the conducting wires are to be fitted. It is only necessary to turn the switch and gently till the lamp to light it. With the household apparatus there are supplied: the sterilising cylinder, the quartz lamp, the automatic tap, a resistance, and a D.P. switch, all fixed on the marble slab.

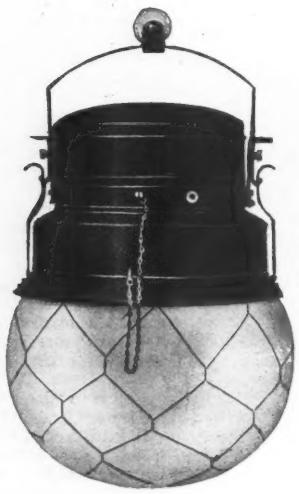


FIG. 254.—WESTINGHOUSE COOPER-HEWITT CO.'S "SILICA" LAMP, TYPE Z 2.

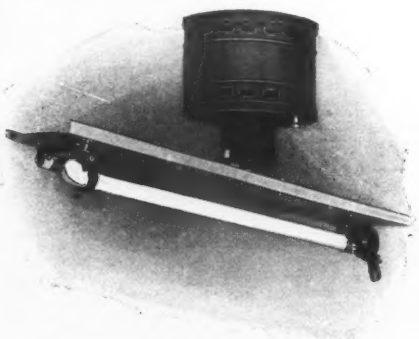


FIG. 255.—COOPER-HEWITT A.C. LAMP.

The Westinghouse Cooper-Hewitt Co., Ltd. (82), 151-2, *Great Saffron Hill, E.C.*

The singularly diversified uses of the mercury-vapour arc are well exemplified by this exhibit, which shows its application to lighting (including printing and photography), the rectification of alternating currents, and the sterilisation of water—three uses which on the face have absolutely no relationship. Under the first heading, in addition to the well-known Cooper-Hewitt lamps with long glass tubes, the Westinghouse "Silica" lamp is shown. We illustrate one of these, type Z 2, rated at 3,000 C.P., and taking 3½ amperes at 200-250 volts (fig. 254). The incandescent mercury vapour is enclosed in a quartz tube, which is automatically tilted to start the arc, and thereafter needs no attention. The mean hemispherical C.P. is stated to be 3,600 C.P., at a power consumption of 0·22 watt per candle, and the maximum is 5,000 C.P. over a range of 20° on either side of the vertical. A minimum life of 1,000 hours is guaranteed, but the average life of the burner is 2,000 to 3,000 hours. Large numbers of lamps of this type, including the 800-C.P. pattern taking 1½ amperes, are in use in this country.

The Cooper-Hewitt lamp is not capable of burning on alternating currents, but this difficulty is overcome by the apparently paradoxical device of feeding it through a mercury-vapour converter. A lamp of this kind is shown in fig. 255; unlike the D.C. lamp, it requires no separate inductance in series with it, so that

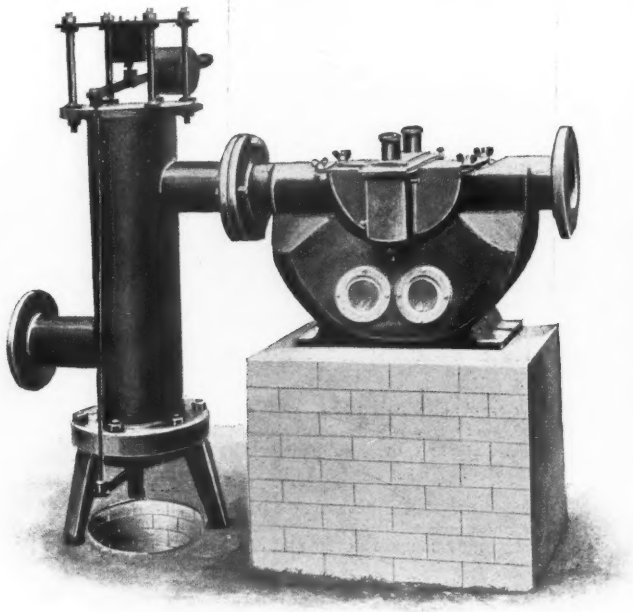


FIG. 256.—WESTINGHOUSE WATER STERILISER.

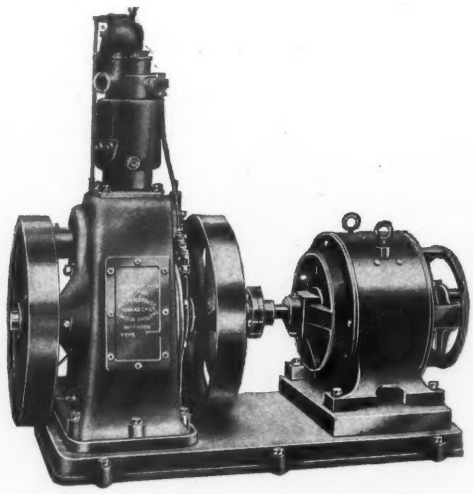


FIG. 257.—"CROSS" 10-H.P. OIL ENGINE SET.

the A.C. lamp, it is stated, is actually more efficient than the D.C. lamp.

Experiments have been in progress for a long period with a view to normalising the colour of the light emitted by the mercury-vapour lamp—a difficult problem; all attempts to obtain this result by intermixture of other elements inside the tube have hitherto failed, but the device of employing a fluorescent medium as a reflector to convert a proportion of the rays from short to

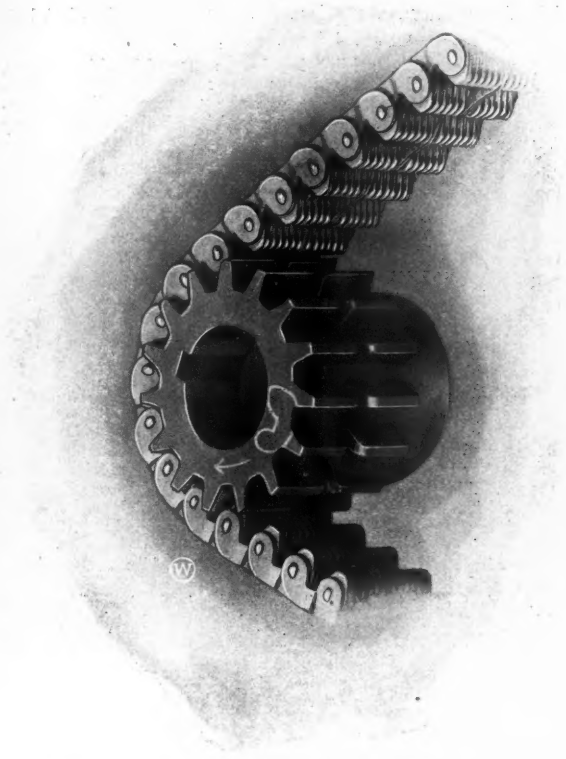


Fig. 258.—Westinghouse-Morse Chain Drive.

longer wave-lengths has been perseveringly developed, and a lamp is exhibited, fitted with one of these reflectors, which gives a light of normal white colour. We understand that the life of the fluorescent material, which formerly was too short for commercial use, is now at least 1,000 hours, and the active surface is easily renewed. The importance of this improvement can hardly

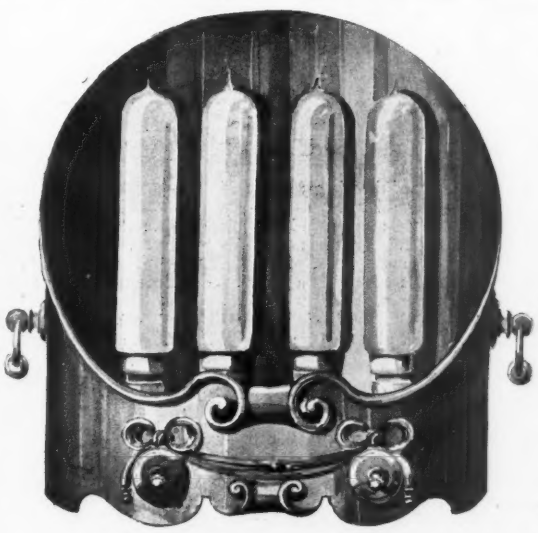


Fig. 259.—Emanuel Radiator.

be over-estimated, as it renders this extremely economical illuminant (·33 watt per C.P., or ·45 watt per spherical C.P.) applicable to very many uses for which it was formerly unsuitable. The appearance of the lamp is similar to that of fig. 255, but with a semi-cylindrical reflector.

The mercury-vapour converter is exhibited in a form particularly developed for the operation of projection arc lamps from A.C. circuits; this apparatus is entirely automatic, starting up the moment the A.C. switch is closed, and the carbons are brought together; for an output of 60 amperes at 60 volts, two 30-ampere units are used in parallel, and these are so arranged with cross-wound inductance coils that neither unit can be overloaded. For

Fig. 260.—Cast Pendant Fitting.

Fig. 261.—Newel Post Fitting.

Emanuel Fittings (see page 664).

bioscope use, the apparatus, which is practically fool-proof, is admirably adapted.

Another feature of the stand is the Westinghouse water steriliser, working with ultra-violet light from the Silica lamp. The apparatus shown is capable of dealing with 600 cb. metres of water in 24 hours, using 26 watt-hours per $m.^3$, and is similar to apparatus in operation at Marseilles and Maromme for public water supply. The manner in which the sterilisation is effected has already been explained in our pages. Various other uses of the mercury-vapour arc—for photo-printing, portraiture, &c.—are exemplified in the exhibit.

The Westinghouse Brake Co., Ltd. (6),

82, York Road, King's Cross, N.

The principal exhibit of this company is a 10-H.P. "Cross" oil engine, coupled to a 5-KW. dynamo on a common bed-plate, and supplying current to other apparatus on the stand. This engine is made by the company for outputs from 5 to 50 H.P., with one, two or four cylinders, according to size, and runs on paraffin costing 2½d. per gallon, of which it consumes ·7 lb. per H.P.-hour; but the makers inform us that it can be arranged to burn anything in reason. The engine is of the vertical single-acting four-cycle type, and the fuel sprayed into the combustion chamber is ignited by the heat of compression. An interesting feature is an annular pocket near the combustion chamber into which air is compressed and cut off before the piston reaches the end of its stroke; ignition follows, and the piston, moving down again, opens this pocket, releasing the charge of heated compressed air, which mingles with the burning fuel, and ensures complete combustion. An exceptionally clean exhaust results, besides increased economy, and there is no deposit of carbon on the valves and cylinder.

The governor varies the stroke of the feed pump to suit the load, so that no explosions are missed altogether, but the strength of the explosion is varied. No carburetter or vaporiser is required, and no sparking plug. Double check valves are used on both the suction and the delivery side of the fuel pump; automatic lubrication by a rotary oil pump is provided, and the engine is of simple and substantial construction.

Another important exhibit is a variety of Westinghouse-Morse silent high-speed rocker-joint chain drives; similar drives have been made for powers ranging from ¼ to 1,000 H.P., and

part of a 130-H.P. drive is actually shown. These chains are so constructed that the wearing parts, of hardened steel, roll upon one another instead of rubbing, thus reducing friction and increasing the life of the chain. Fig. 258 (opposite) admirably shows the appearance of the chain and pinion, and the method by which the former is kept in position by guiding links running in a groove on the pinion. It is claimed that the efficiency of these drives in actual working is over 98 per cent.

Messrs. A. Emanuel & Sons, Ltd. (195, 220).

7-13, George Street, Manchester Square, London, W.

Messrs. Emanuel are displaying a great variety of manufactures for electric lighting and other purposes. Their electric light fittings, which include examples of many designs and finishes, are very effectively arranged, and bearing in mind their specialised experience in all classes of art metal work one is not surprised at the beauty of some of the specimens shown, whether in hand-hammered or cast work. We illustrate a newel post fitting (fig. 261) and a cast pendant fitting (fig. 260) (which is not so ordinary as it may appear to be) as representative of this department of the firm's business. Other exhibits that should be mentioned to indicate the field prepared for on this stand are picture lighting, reflector fittings, 'shoplite" fittings, outside lanterns for metal-filament lamps, the 'Kwik-fix" ceiling rose, and "Ennyvolt" bells, of which we have already given descriptions in our pages. In fig. 259 we show a luminous radiator with metal work of a quite unique design.

The Efandem Co., Ltd. (4),

244/246A, Corporation Street, Birmingham.

On this stand, considering its dimensions, there is, perhaps, as great a variety of electrical manufactures as on any stand in the building. Of course, as our readers have already been made aware, the line upon which the firm has been particularly concentrating attention of late has been the wholesale manufacture of pocket lamps (cases, batteries and all complete), and while there is a very imposing representation made of these, one has only to spend a few minutes on the stand to discover quite a number of other lines of equal interest. Since the intentions of the firm were announced, they have been inundated with orders for pocket lamps and batteries; not only has the home demand been large, but in the Colonies there is a strong evidence of the preference that exists for a British article. The works production for the season was sold in

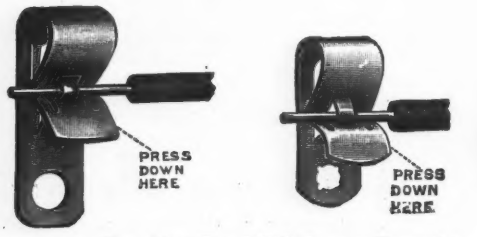


FIG. 262.—THE T.E.C. SPRING TERMINAL.

advance. The "T.E.C." dry cells, batteries and refills for these pocket lamps, and generally for portable lamps, are a new line made on a new principle. The "T.E.C." is a jelly cell, not a plaster one, and the firm claims to be able to make it in England at competitive prices against Continental competition. All the batteries in the lamps are fitted with the special T.E.C. patent spring terminal shown in fig. 262, which facilitate rapid connection, obviate the tendency to short-circuits, and eliminate the possibility of faulty or loose connections and of wires breaking off. In a fully illustrated circular the firm shows that the connections are applicable to all sorts of electrical apparatus, coils, bells, telephone, telegraph and measuring instruments, ignition batteries, &c. Three other matters call for mention. First, there is shown prominently within the range of vision a section of "Universal" sign and illumination material and accessories therefor; it is very effective, and particulars may be available later. Secondly, but perhaps as prominently as anything else, there is a speciality which has not only interested the outsider, but has received the attention of a number of the best known firms exhibiting in the same building. We refer to the magazine screw-driving attachment for sensitive drills. This is a new device of great ingenuity for driving wood screws quickly and without injuring the heads, and is equally suitable for flat or round heads. For cabinet makers, manufacturers of electrical apparatus and all who require to drive a large number of screws into similar class work, we can readily believe that this tool will save its cost in a very short time. It drives screws into hard wood, easily and quickly, without previous drilling. One tool will do the work of several hands and practically makes screwing as cheap as nailing. The tool is entirely self-contained. It is instantly attached to the machine, in the same manner as an ordinary drill. It is self-feeding; the operator merely puts a number of screws in the hopper, which automatically separates them, and supplies the screws singly as required, and as quickly as ever necessary. The tension adjustment is exceedingly simple and positive. Screws can be driven in hard wood as easily as in soft wood. The tool accommodates itself to the inaccuracies which occur in ordinary screws. Any faulty screws, such as, for example, a screw having no slot in the head, can be instantly discharged from the driving nozzle. It is made in three sizes. Lastly we may refer to an article which can shriek for itself, a motor-driven siren—indeed, we believe that in the early days of the Exhibition it so signally succeeded in demonstrating its ability to summon all and sundry from far and near that it has since had to be asked to keep quiet and give others a chance. This it has courteously done—nevertheless, it is well able to speak for itself when required.

The Armorduct Manufacturing Co., Ltd. (120, 121, 138, 139),

Farringdon Avenue, E.C.

A very attractive exhibit has been arranged by this company, considerable care having evidently been expended upon its preparation and arrangement. Naturally, the "Armorduct" steel conduit system occupies the premier position, both light and heavy

FIG. 263.—"THERMA" KETTLE.

FIG. 264.—"THERMA" IRON.

gauge conduit being shown, in various forms, and complete sets of connecting pieces, outlet fittings, and other accessories are displayed. A special feature is the "Armorduct" universal knock-out box, which is now made with ready-screwed sockets, as recently described and illustrated in our "New Devices" column. Watertight fittings for a variety of purposes are also shown, together with wires and cables of all kinds, the "Gral" metallic-filament lamps and electric fans.

A spiral of "Armorduct" steel conduit, bent cold, serves to illustrate the toughness and sound jointing of the tube. A patent adjustable fittings box, draw-in boxes made watertight with

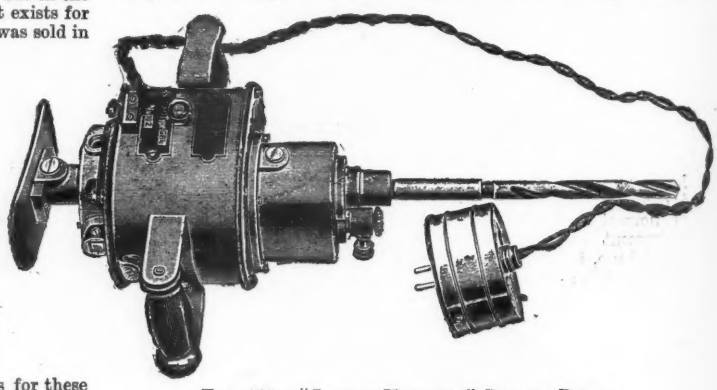


FIG. 265.—"LITTLE HUSTLER" BREAST DRILL.

"Electrokit," and a series of new multiple junction boxes all call for special notice.

The "Therma" heating and cooking apparatus is well represented, including all kinds of self-contained cooking utensils; we illustrate in fig. 263 an electric kettle, and in fig. 264 a domestic iron which is particularly recommended by several central station authorities on account of its reliability—all the "Therma" apparatus being made with a view to excellence of quality rather than low prime cost.

The "Little-Hustler" electric drill, and other electrically-operated tools, are also shown; we give in fig. 265 an illustration of the breast drill.

The National Telewriter Co., Ltd. (269),

20, Bucklersbury, E.C.

Various important simplifications and improvements are incorporated in the latest models of the "Telewriter" exhibited at this stand. A private wire type "Telewriter" sends and receives messages to and from Stand 146, and visitors can themselves test the convenience of use and accuracy of reproduction of the instrument. A significant development is the establishment of "Telewriter" exchanges in the City and West End. These employ Post Office lines, by permission of the Postmaster-General, and their utility will be greatly enhanced as the number of subscribers (at present about 150) increases. The exchanges are connected to the Central Telegraph Office at St. Martin's-le-Grand, and subscribers can therefore send and receive telegrams by "Telewriter." The time thus saved (15—30 min. per message) is often of vital importance in business transactions. We are informed that about 400 private-wire "Telewriters" are now in use in London, some of these instruments being used as shop-window advertising media.

Messrs. Parmiter, Hope & Sugden (81, 91),

Hulme Electrical Works, Manchester.

It is claimed that "Hope's Bimetal Fuse-wire," which was first introduced to the general public at Olympia, at the stand of Messrs. Parmiter, Hope & Sugden, can be arranged to blow with certainty within 5 per cent. of its rated limit—improving, in fact, on the accuracy of many electromagnetic circuit breakers.

Fig. 266.—Hope's Bimetal Fuse-Wire.

As shown by fig. 266, the bimetal fuse consists of a copper wire surrounded by a patent lead-alloy; the gauge of the core is so chosen that the copper will fuse at a certain current after a desired time, and an appropriate* amount of soft metal is then forced on to the core by a process exactly similar to that employed in lead-sheathing electric cables. The fuse, as so constructed, combines the advantages of tin and copper fuses without the grave defects of either. The sheathing, being almost pure lead, is acid-proof, and entirely protects the copper from corrosion.

While the fuse is comparatively cool, the greater part of the current traverses the copper core, but as the latter heats, a greater

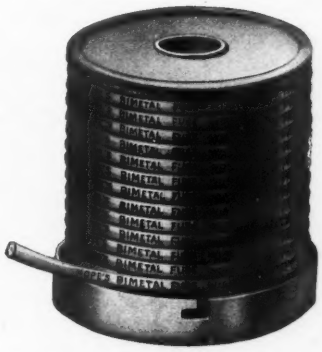


Fig. 267.—Reel of Fuse Wire.

percentage of the current flows through the sheath. When the temperature of the latter reaches 180° C., which does not occur till the load is over 95 per cent. of the fusing current, the soft metal covering melts, and, running away, leaves the whole load on the central section of the copper core, which at once glows and fuses. It is important to note that the soft metal does not volatilise except on the heaviest short circuits (about 20 times full load), and that the fusing of the copper core makes far less "splash" than would that of a plain copper fuse of equal capacity.

A bimetal fuse will carry from 90 per cent. to 98 per cent. of its fusing current indefinitely; for short periods, varying inversely with the overload, it will carry from six to ten times its fusing current, a property which is especially valuable in motor and arc lamp circuits. The resistance of the compound fuse wire is much less than that of the equivalent plain fuse wire, hence the C^2R losses are proportionately lower, and, apart from the higher efficiency of the fuse, there is no danger of overheated fuse handles. (A plain copper fuse, blowing at 100 amperes, has 20 times as great a loss as the equivalent bimetal fuse.) The actual blowing of the fuse being entirely confined to the copper wire, slight local variations in the composition of the outer alloy are unimportant, and the effect of vibration is nil.

The accuracy with which these fuses blow at the predetermined current offers great prospects of at last realising a definite rating for fuses. The present system of rating by the "continuous carrying capacity" is absolutely indeterminate, but the fusing current is, with the bimetal fuse, practically a physical constant of each size, or, to allow for differences in local cooling facilities, it is, perhaps, better to say that the ratio—

$$\frac{\text{Continuous rating in air, } 4\tfrac{1}{2}\text{-in. break}}{\text{Blowing current in air, } 4\tfrac{1}{2}\text{-in. break}}$$

is practically constant, and usually ranges from 90 per cent. to 95 per cent.

At present bimetal fuses are available in five sizes, blowing respectively at 15, 25, 50, 75 and 100 amperes. A 7 or 8-ampere (blowing current) fuse is in course of development. All sizes are sold in 1-lb. tins arranged on the novel plan shown in fig. 267, the reel being normally protected by a bayonet cap.

* Determined by the required time lag and voltage drop per inch of fuse.

Hope's bimetal fuses can be used in any holder, but, to avoid the disadvantages of many holders now in use, while securing the advantages of parallel fuses and the peculiar merits of the bimetal fuse, Mr. Hope recommends his "Honeycomb" fuse holder (which is also on demonstration at Olympia).

Corresponding to the copper core of bimetal fuse wires, there are in this a number of "through strands" of copper wire connected in parallel and of such a gauge as to blow when traversed by a predetermined current for a specified time. Corresponding to the outer soft sheathing, there is now a central "fusible tin band" soldered to two copper leads which, when the holder is wired, are looped in from the ends and connected in parallel with the "through strands."

The general arrangement of the holder—with its outer fibre case and hand guards, its fire-proof lining and baffle plates carrying the connecting end plates (electrically continuous with the contact blocks), and its corrugated, hollow porcelain fuse carrier—is clearly shown in fig. 268. The component parts are excellently illustrated by fig. 269, and the manner of wiring is shown in fig. 268.

At normal load the bulk of the current passes *via* the "through strands"—the line of least resistance—but as the load increases more and more current is shunted through the "fusible tin band" till this melts (usually at the soldered joints), thus throwing the whole load on to the copper through-fuses, which at once blow. On heavy overloads a considerable amount of copper vapour is thus rapidly generated, but is cooled by the restricted passages or "cells" through which it is compelled to pass. On reaching the baffle plates (3, fig. 268), the copper vapour is thrown back into the central chamber of the porcelain holder and there remains (this action occurring at *both* ends of the fuse) long enough to condense; practically no vapour escapes into the open air. As the result of their quiet action and deposition of all copper

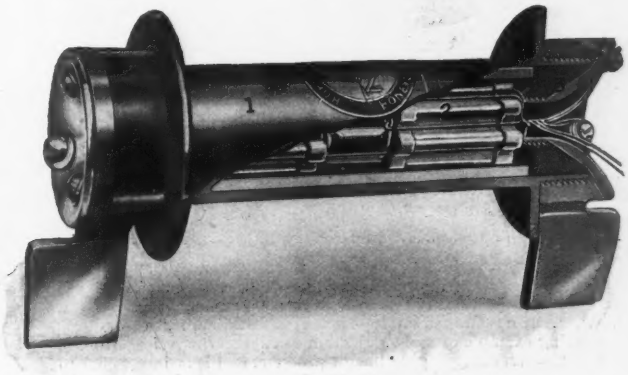


Fig. 268.—Construction of Honeycomb Fuse-Holder.

within the central passage, these fuse-holders withstand repeated short circuits. Even on battery short circuits their action is safe and reliable, and has a definite time element (depending on the design of the tin band).

The re-wiring of a Honeycomb fuse is very readily effected, through-strand-wire and fusible tin bands (with connectors attached) being supplied ready for use. Three types of holder, each in five sizes, are at present made, to suit fusing currents of 20-120, 100-250, 200-350, 300-500 and 450-650 amperes respectively. Fusible tin bands are provided in four capacities; the overall size of the bands

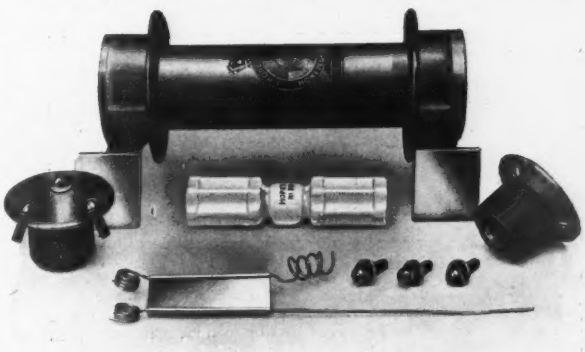


Fig. 269.—Component Parts of Honeycomb Fuse-Holder.

in each set is constant, but those of smaller capacity are punched with suitable holes to reduce their effective section.

Though inferior to bimetal fuse wire, both in accuracy and efficiency, the honeycomb-fuse, properly wired, will blow with less than 25 per cent. overload, and has a considerably lower C^2R loss than the equivalent plain copper fuse. The fuse has a heavy temporary overload capacity, but the fusible tin band provides a definite and regulable time element. Recent tests by Mr. S. L.

Pearce (Manchester Corporation electrical engineer), fully justify the claims made for the new fuse and its carrier.

While we have concentrated our attention upon these novel devices, we must add that the firm have in addition a comprehensive exhibit of their ironclad switches and switch-fuses of various types, Hope's patent "Start-run" switch-fuse for starting A.C. motors, mining switches, distribution boards, &c., which are well worthy of inspection.

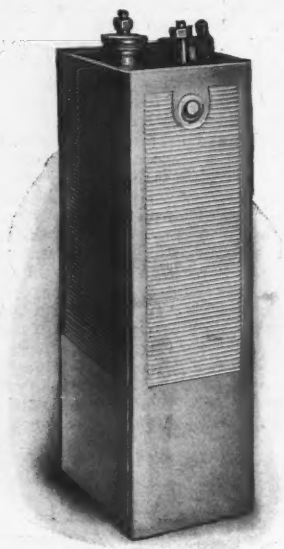


FIG. 270.—COMPLETE CELL, TYPE A 6.

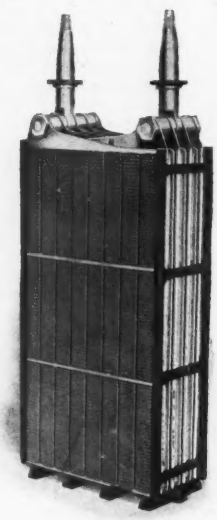


FIG. 271.—PLATES ASSEMBLED.

FIG. 272.—CELL WITH COVER REMOVED.

THE EDISON ALKALINE ACCUMULATOR.

The Edison Manufacturing Co., Ltd. (253, 254),

Edison Works, Willesden Junction, N.W.

The Edison alkaline storage battery has chosen this appropriate occasion for its reappearance in this country, and an extremely interesting exhibit of its various forms and component parts is on view. As we remarked on its earlier presentation, this cell affords a striking example of the application of engineering science to the solution of an exceedingly difficult problem, and it is impossible to examine its construction without a feeling of admiration for the skill and ingenuity with which it has been designed. We understand that it is the product not of one, but of a large number of brains, in an establishment where adverse criticism, if well founded, is as handsomely rewarded as constructive suggestions are, so that, as far as possible, every contingency has been foreseen and provided against.

The withdrawal of the cell after its extended demonstration in 1903 is explained on the ground that "it is an Edison policy that no new product shall be publicly exploited till it has been thoroughly tried out in a practical way outside the laboratory." This hardly seems convincing, for the battery was thoroughly "exploited" years ago; it is stated that weaknesses were found in the first two types, while the third showed too great a loss of capacity in three years' use, and no doubt to these defects must be ascribed the withdrawal. Now, however, we are assured that the performance of the new Type A battery has satisfied even Mr. Edison, and it will at once appear upon the market here—it is already on sale in the United States.

Eager, as we confess ourselves to be, to see the electric automobile assuming its rightful place as *the* ideal means of road locomotion—whether for pleasure or profit—we welcome the Edison battery as offering new possibilities. It is claimed that it weighs about half as much, and occupies only three-quarters as much space as a lead battery, while it has a vastly greater life; it can be charged quickly, left discharged or overcharged without injury. It contains no acid, cannot sulphate or buckle, cannot lose its active material, stands vibration with impunity, and grows in capacity when put in service; and its maintenance in good order is a simple matter. The makers offer to guarantee at least 90 per cent. rated capacity after three years' service in a delivery wagon.

Against these advantages, most of which, we believe, are fully justified, must be set the lower energy efficiency of the Edison cell and its higher cost. As regards the former, it must be pointed out that the cost of energy is not a determining factor in the question under present conditions, and the higher initial cost must be considered with due regard to the life and maintenance of the battery. In fact, we believe that efficiency and initial cost are minor matters compared with reliability, quickness of charging, long life and simplicity of handling. No other battery need be displaced by the Edison, for we look to it to create a new demand.

We described the construction of the cell on the previous occasion pretty fully; we need, therefore, only recapitulate the details here, by way of reminder. The positive (nickel) plate consists of perforated steel tubes, heavily nickel plated, and filled with alternate layers of nickel hydroxide and pure metallic nickel in exceedingly thin flakes (substituted for the graphite used in the earlier cells to give conductivity); the negative (iron) plate is a grid of nickel-plated steel, holding rectangular perforated steel pockets filled with powdered iron oxide. The plates are separated by "hard rubber" (ebonite) strips from one another, and by sheets and racks from the nickelled-steel container into which they closely fit. The joints of the container and the cover are welded.

The cover is provided with stuffing boxes for the terminals, a device for separating spray from the escaping gas when charging, and an opening for filling the cell, covered with a water-tight cap. The connections are made with coned lugs fitting on the taper terminal posts. The voltage of the cell during discharge is 1·2 volts, and a pressure of 1·85 volts per cell is required during charging. We give a number of illustrations showing the type A cell, the plates, &c., from which the construction of the cell can be readily understood.

Richard Pape, Ltd. (196, 219),

Belvedere, Kent.

This firm is showing the "Fors" patent accumulator, of which it is the sole manufacturer; the interesting characteristics of these cells have been described in our pages, and various types are shown suitable for ignition and lighting purposes. A speciality of considerable interest is the Pape safety lamp designed for use in mines (for rescue work), ships' bunkers and magazines, &c., or anywhere where hard usage is experienced. The lamp case is of stout aluminium in one piece, surmounted by a lantern, and contains a "Fors" accumulator giving 4 C.P. (in two 2-C.P. bulbs) for 9 or 10 hours. By unscrewing one milled nut, the lantern can be lifted off and the accumulator removed for recharging. The lamp is air-

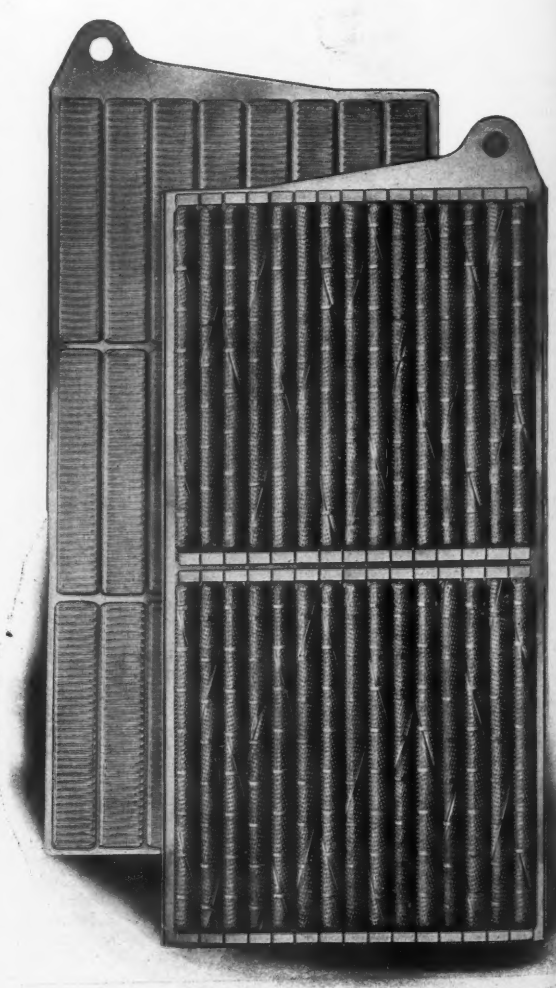


FIG. 273.—POSITIVE AND NEGATIVE PLATES OF THE EDISON CELL.

tight; its two bulbs ensure against total extinction of light; it weighs 5½ lb. only, is 11 in. high and remarkably simple and compact in construction.

The Benjamin Electric, Ltd. (151),

117, *Victoria Street, London, S.W.*

The feature at this stand is the Benjamin wireless cluster principle which they have applied to many kinds of fittings for ceiling lighting, pendant fittings, Holophane arcs, carriage lighting, marine and outside lighting, &c. The complete range is particularised, and prices are given, in their new green booklet. In fig 274 we illustrate a five-light wireless cluster body parallel connected, showing

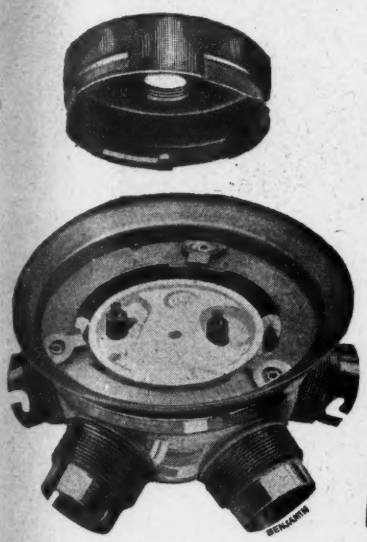


Fig. 274.—Five-light Cluster Fitting.

Fig. 275.—Twin Lampholder.

Fig. 276.—"Benco" Lampholder.

Fig. 277.—Friction Screw-driver.

the terminals and detachable base. Another speciality is a range of shop window lighting and show-case reflectors. "Benco" patent lampholders and adaptors are likewise exhibited. They are intended for either indoor or outdoor work, adaptable for use on high-voltage circuits, with lamps of high candle-power in one-light fittings, conduit work, for outlining buildings and train or railway service. The interiors are made in two pieces of vitreous china, covered by a metal casing. The terminals and conducting parts are enclosed and insulated from the outside casing, and no earthing wire is necessary. Fig. 276 shows the holder equipped with gallery, and 275 the twin holder. We understand that the Benjamin friction drive screw driver (fig. 277) has proved a great attraction during the run of the exhibition.

Messrs. J. H. Tucker & Co. (78, 94),

Birmingham and London.

Messrs. Tucker's exhibit consists of examples of their numerous switch specialities, switch and distribution boards, &c., and includes an extensive display of ironclad D.P. and T.P. switches and fuses for from 12 to 350 amperes per way, the fuses being of either the porcelain replacement or asbestos covered type; ironclad switches are also shown with interlocked covers, which cannot be opened unless the switch is in the "off" position. A fine range of knife switches of up to 1,200-ampere capacity and of handle-type fuses in similar sizes is shown, also two private plant switchboards with knife and spring contact switches, N.C.S. regulators, and the usual instruments. Messrs. Tucker are, perhaps, better known for their small switches and fittings, and in this direction their exhibit includes tumbler switches of all kinds, wall plates, wall plugs of the water-tight and hand-shield patterns, bell pushes to match tumbler switches, &c., and, in fact, switch accessories of all kinds.

Messrs. Simmonds Bros., Ltd. (160),

Newton Street, High Holborn, W.C.

The well-known "Niphan" couplings and plugs, for use in connection with flexible cable, for portable electrical installations, are shown on this stand. The system deals with anything from 5 to 100 amperes at 500 volts, and has been very extensively adopted in situations where unskilled labour conditions have to be met. A recent addition to this system is a 5-ampere combined switch and plug. Both sockets and plugs are supplied with a third earthing terminal if required.

Messrs. Longstreths, Ltd. (167),

190, *Queen's Road, Battersea, S.W.*

The firm are exhibiting their Lithanode cells for house, shop, garage, ship lighting, &c., and emphasise the construction merits of their battery plates by means of short-circuit tests of two 100-ampere-hour cells having a normal discharge rate of 10 or 12 amperes. These have been subjected to short-circuit discharges of 600 or 700 amperes two or three times daily since the Exhibition opened, without detrimental effect.

Messrs. Longstreths claim that they are the only people giving a guarantee against buckling with their battery plates, in which, we may add, the pellets of active material are enclosed in a lead frame, formed by pouring the lead in a molten state round the pellets, and taking advantage of the shrinkage which occurs while it is solidifying.

The firm are now developing the Lithanode cell in larger sizes, and typical examples are shown.

Other smaller but no less interesting exhibits are unspillable cells for ignition and similar work: these are used in the numerous portable lamps for which the firm are noted, and one interesting application, we may mention, is a combination medical battery for cautery and searchlight work, weighing under 10 lb., in which a series-parallel combination of the two cells used, by means of a neat automatic commutator switch and regulating resistance on the lid, allows of 10 ampere-hours capacity for lighting, or double that amount for the cautery. As the cells are detachable, a spare one can be kept to insert on emergency.

The Sun Electrical Co., Ltd. (104, 111),

118, 120, *Charing Cross Road, London, W.C.*

One of the most prominent features of this stand is the Kalkos system of wiring, which, it is claimed, is entirely free from all condensation troubles. It consists in the main of tinned brass tubes, which are socketed and soldered to tinned brass boxes. The Kalkos box is screwed internally and provided with an adjustment ring, the switch is watertight and the dolly automatically earthed. The

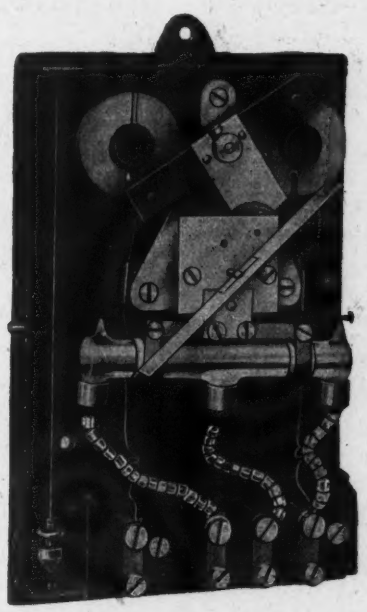


Fig. 278.—Mercury Type D.C. Flasher.

system can be used for both twin and concentric wiring, and the same boxes, accessories, &c., are used for flush, semi-flush and surface work. A new type of box has been designed for use with standard steel and iron conduit. The "Sunlite" reflectors are also

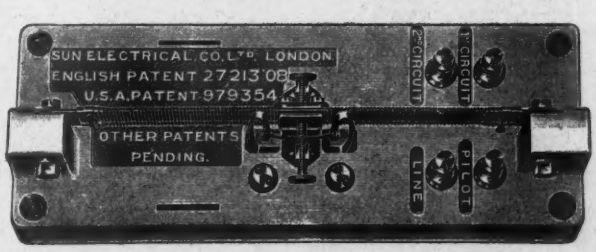


Fig. 279.—Quick-break Thermo-blink Flasher.

exhibited for a variety of purposes, especially for shop-window lighting; they are made to suit the standard sizes of lamps of various makes, and produce a brilliant effect, with high efficiency. Many types of signs are shown, including the kaleidoscope sign with its varied rich colour effects, and signs with opal relief letters.

The latter is a most economical means of obtaining the maximum effect at a minimum expenditure of power, one 16-c.p. metal-filament lamp being sufficient for each letter up to 8 in. high. On the facias are shown different types of wood letter signs in block, fancy and script characters. These are operated by various flashing effects, giving an idea of what can be done in this direction. One sign is flashed on letter-by-letter, and followed by a script lamp-by-lamp lighting effect. Another sign is operated by several of the new two-way quick-break "thermo-blinks," causing an ever-changing colour effect to take place on the sign; although various colour changes are made, the sign itself is always illuminated. Another sign embodies the trade mark of the S.E. Co., in which the rays of the sun are represented by small lamps radiating from the centre and operated by a motor flasher.

The Sun Electrical Co. have specialised in flashers, and their types now include the single thermo-blink flasher, two-way thermo-blink flashers, magnetically-operated mercury flashers (one and two-way) and motor flashers. All these are suitable for operating on either alternating or direct current. A large range of electric light accessories, cables, instruments, telephones, electric bells and indicators, electric fans, arc lamps, electric radiators and heating and cooking apparatus of all kinds are shown. A mysterious hand knocking the "Flexalite" candle-lamp to and fro without affecting its brilliance forms a striking feature of the exhibit.

Messrs. Wm. Geipel & Co. (204, 211),

Vulcan Works, St. Thomas Street, S.E.

Messrs. Geipel's exhibit is a comprehensive one embracing carbons, insulators, time-switches, cables, tapes, steam traps, &c., all of more or less interest to the engineer.

The firm are sole agents for the Henrion carbon specialities, which include arc carbons of many kinds and several hundred patterns of dynamo brushes—both graphitic and non-graphitic.

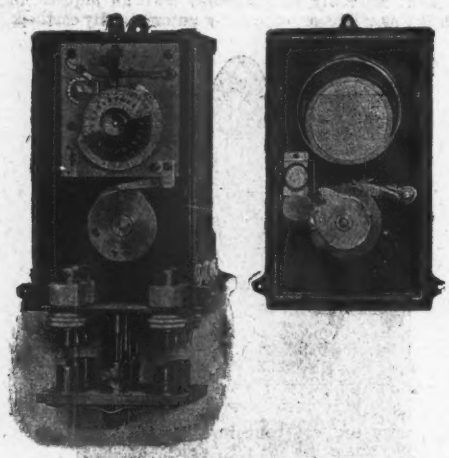


Fig. 280.—Showing Mechanism of the "Arbiter" Time Switch.

A special feature is a display of the Locke H.T. pin and suspension type insulators; one of the latter, comprising six units, is typical of many thousands in use in America on 110,000-volt transmissions.

The exhibit also includes, in the switch section, hand-operated and automatic motor controllers and rheostats; two types of time

Fig. 281.—"Opus" Time Switch.

Fig. 282.—Interior, "Opus" D.P. Change-over Switch.

switch, viz., the "Arbiter," intended for use with "restricted hour" supply, and the "Opus," for the automatic switching "on" and "off" of street lamps, &c., over 100 of the latter type being in use in Manchester at the present time.

In connection with transmission work, a variety of cables, including the "Firmacit" type, with an acid-resisting covering for overhead aerial work, aluminium conductors, and the well-known Okonite and Manson tapes, &c., will be found on the stand.

Messrs. Jas. Gordon & Co. (188),

Knightrider Street, E.C.

This firm has an interesting exhibit of specialities for the hydraulic and steam power user. These include a 70-B.H.P. Pelton wheel for 400-ft. head and 900 R.P.M., fitted with oil and water-tight ball bearings, and a spear nozzle regulator with hand wheel;

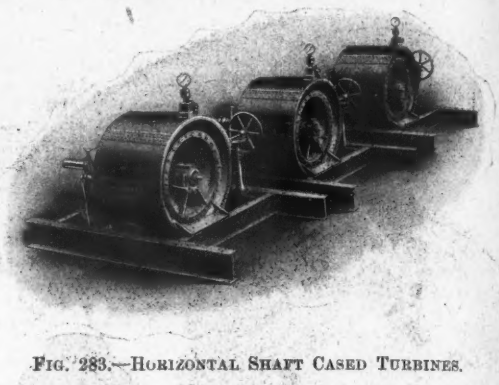


Fig. 283.—Horizontal Shaft Cased Turbines.

also a vertical shaft Samson type turbine for 30-ft. head, to give 40 B.H.P.

A Gordon patent sectional superheater will catch the eye of the steam user; this is constructed throughout of mild steel, the headers being rectangular in section of rolled steel ¾-in. thick, and the tubes solid drawn of 9 W.G. thickness.

The tubes are fitted in groups of three, with flange plates secured to the headers by set screws.

Any section of tubes can be removed in quick time and without interfering with any large joint or brickwork, and the openings to the header blanked off until the section can be reinserted.

In connection with this may be mentioned Gordon's patent two-way valve for use with the superheater, and which, while acting as a stop-valve, can be adjusted by a hand lever, so as to divert the steam either through the superheater or direct to the steam range, or in varying proportions in both directions at once.

This is a simplification of the usual arrangements involving several valves and pipe connections.

Another exhibit worth noting is a 900-B.H.P. Davy patent coupling, which is reversible and constructed of metal throughout.

London and Rugby Engineering Co., Ltd. (23, 38),

10, *Bush Lane, London, E.C.*

A display of the Rugby incandescent electric lamps is here made, the lamps ranging from 2½ C.P. in the low voltage to 300 C.P. in the high voltage; a new price-list of these has been issued. A show-case illustrates the various steps in the manufacture of the lamps. Small transformers are also present here.

The Synchronome Co. (223),

32—34, *Clerkenwell Road, E.C.*

The exhibit of the Synchronome Co. is a demonstration of modern methods of securing and distributing uniform and accurate time. In addition to their usual display of electric clocks suitable for schools and colleges, asylums and hospitals, offices and works and institutions of all kinds, a very fine precision regulator or astronomical clock, which is claimed to be one of the most accurate timekeepers ever made, is exhibited. The pendulum is impelled by the "Synchronome" self-winding and switching action applied underneath the bob, and the escapement deals in an entirely original manner with causes of irregularity which are usually neglected, such as the circular and barometric errors. We understand that this instrument will be much in evidence before the learned societies this season as a contribution to the science of accurate time measurement.

Abbey Electric Co. (5),

17, *Victoria Street, S.W.*

The firm are exhibiting their "Abbey" arc lamps, of the enclosed flame and long-burning triple carbon patterns, also choking coils and accessories for use in connection with them. The "Abbey" lamp, which has already been referred to in our pages, embodies many interesting features.

The Skefko Ball Bearing Co., Ltd. (257),

Carlton House, Lower Regent Street, S.W.

The high-class ball bearings made by this company have been described in our pages, and are here represented by a variety of patterns suitable for electrical and other high-speed machinery. Radial, thrust and double-thrust bearings, with automatic alignment, and so assembled that they cannot be put out of adjustment in the operation of fixing them in position, are shown.

The British Electric Transformer Co., Ltd. (30, 31),
Hayes, Middlesex.

This company is exhibiting a 100-KW. "Berry" transformer working in series with a 10-KW. transformer, and controlled by automatic switchgear on the well-known Berry series system, which reduces light-load losses; when the load is within the rating of the small transformer, the large one is practically idle, but when the load increases beyond this limit, the small one is short-circuited on both sides, and the large one takes the load. The gear now exhibited has been greatly improved by the substitution of an oil-switch for the air-break switch formerly used to short-circuit the primary of the small transformer; this has made the switch work more quietly and with a very short movement, and has enabled the operation of the gear to be made more directly positive than formerly. The apparatus is shown in operation on a bank of lamps. An interesting arrangement of fuses in conjunction with a relay forms part of the switchgear, which ensures that if the small transformer breaks down, the load shall be transferred entirely to the large one. An oil-cooled three-phase transformer with a neat arrangement for the tapping terminals is also shown.

The company installed four transformers—two of 250 KW., and two of 75 KW.—for the supply of the Exhibition; as already mentioned, these convert from the two-phase supply of the Hammersmith Corporation to three-phase current, which is ultimately fed to a rotary converter. These transformers are in the model sub-station, and practically all the power used in the Exhibition passes through them.

The Imperial Lighting Co. (233),
157, *Blackfriars Road, S.E.*

The electrical illumination of the front of Olympia was carried out by this firm, and a description of the work has already appeared in our pages. On the stand inside the building a great variety of illuminating strips is shown—one of these being the same type as that used at the White City, where it has been immersed in water for 3½ years without deterioration. Letter signs built up of 1-C.P. 14-volt carbon lamps, and of 2½-C.P. 14-volt metallic lamps—taking 3 watts each in either case—are exhibited, with various other signs and devices.

Motor-flashers are a speciality of the firm, and are made to any requirements; theatre stage lighting is also one of their special lines, and they show a liquid dimmer, a stage box with aluminium plugs, batten winches, bunch lights and arc projectors, &c. The "Knoxem" fire bell is another noteworthy item shown at the stand.

The Phillips Commutator Grinder Co., Ltd. (7),
27, *Walbrook, E.C.*

This exhibit consists primarily of the well-known Phillips commutator grinder, shown in operation; this device has attained so wide a popularity that, like good wine, it needs no recommendation.

Messrs. R. Hornsby & Sons, Ltd. (9),
Grantham.

This exhibit consists of up-to-date examples of the firm's internal combustion engines, running on suction gas, petroleum and petrol, and designed for direct coupling to dynamos, in connection with which they are shown in operation.

Medway's Safety Lift Co. (171, 192),
10, *Bush Lane, E.C.*

The feature of this stand is an electric passenger lift running up to the level of the gallery, fitted with the firm's lift gear and patent push button and car switch control. A variety of other electrical lift apparatus is also shown.

The Bastian Meter Co., Ltd. (173, 190),
Bartholomew Works, Kentish Town, N.W.

The company are showing their electrolytic meters in various standard patterns, including a new one reading to 500 units, for use on circuits where supply is given on the contract system. A portable sub-meter for heating circuits is also shown; this is intended to enable extra heating circuits to be dispensed with, the heating apparatus being coupled to the lighting circuit through this meter, which is so designed as to be unspillable, and is provided with a seal on the refilling device.

Messrs. G. W. Goodchild & Partner (237A),
30-32, *Farringdon Road, E.C.*

This exhibit consists of a machine tools, small tools, gauges, &c., including the products of Messrs. Ludwig Löwe & Co., of Berlin, for whom the firm are the sole British agents. A useful three-way lathe-tool holder of novel design is shown, and the "D. W. F." ball-bearings—for which the firm are wholesale agents—with a double row of balls, and made in various sizes and patterns, are items worthy of special mention.

Consolidated Pneumatic Tool Co., Ltd. (50, 73),
Palace Chambers, Westminster.

The company's stand is, as usual on occasions such as these, an object lesson in the use of portable electrically-driven tools, and more particularly of drilling apparatus, which will be found in considerable variety.

Messrs. W. C. Tackley & Co., Ltd. (286),
30, *Blythe Road, W.*

This firm is exhibiting fittings and metallic-filament lamps; but by far the most interesting exhibit is the multi-colour switch. According to the number of lamp circuits arranged in the box of an ordinary mono or poly-chrome transparent sign, a number of hard steel contacts are placed symmetrically round a circle. Connection between corresponding (diametrically opposite), contacts is made by a switch arm moved smartly forward 4 to 15 times per minute by a simple ratchet gear. The latter is actuated by a specially robust mechanical clockwork running seven hours per wind. The flasher is obviously independent of line voltage; the standard type carries 10 amperes. The contacts are easily renewable, and between them the switch arm is carried by rollers on an outer brass rail ring. Any selection and combination of colours can be arranged in the various lamp circuits, to the number of which there is no limit. One set of lamps is connected before the last is completely dulled, and a beautiful variety of monochrome and rainbow effects can be arranged; from 240 to 1,000 changes per hour are usual. Deterioration of the contacts is very gradual, and there are, of course, no electrical losses in the apparatus.

The Morgan Crucible Co., Ltd. (144),
Battersea Works, S.W.

The exhibit of this company consists of the well-known "Morganite" plumbago brushes in their various types, "Battersea" carbon brushes, carbon gland rings for turbines, and lightning-arrester resistances, with all of which our readers are familiar.

The gland rings have proved highly successful in solving the difficult problem of packing turbine shafts, and are in great demand. The "Morganite" brushes, which are not subjected to a high temperature in the process of manufacture, have a very low coefficient of friction, beside which metal tops and flexibles can be embedded in the brushes so as to secure perfect electrical connection, and the resistance of the brush in the peripheral direction can be 7 or 8 times as much as in the radial direction, thus aiding commutation.

The Dussek Bitumen Co. (242),
Deptford, S.E.

The Dussek Co. are well known for their "Trinidite" insulating box compound, which can be seen on their stand, together with various other specialities in oils, grease, paint, &c.

Messrs. L. Weil and Reinhardt (224),
Mannheim.

This firm, whose sole agents in this country are Messrs. O. Rühl Ltd., 77, City Road, E.C., makes a speciality of cable troughing which is shown in various sizes on the stand.

This troughing is made of wrought-iron, hot rolled and tarred inside and out; it is made in semi-circular halves intended to fit closely round the cable and replace, if necessary, the ordinary armour sheathing provided on cables. The halves of the troughing are fastened together by clamps and cotters—two or three to the yard run—and are suitable for cables of diameters between 1½ in. and 4¾ in.

National Machine Recorder Co. (326),
64th and States Streets, Chicago.

All interested in machine shop and general manufacturing economy should inspect the ingenious recorder exhibited on this stand. The standard machine has 50 pencils side by side recording on a paper drum driven by a reliable clock. Each pencil is electrically controlled, and each machine or tool (whether a lathe, planer or wire-braiding machine, &c.) is provided with an appropriate contact device placed beyond tampering by the workman. When, and only when, the machine or tool is in proper production, the recorder contact is closed and the corresponding tracing pencil is deflected to register production on the recorder sheet. An integrating device shows the total time which each tool is in production, and to control the use of lathes, &c., which may work at various speeds, an adjustable time switch is provided. This is set to the time which may justifiably be spent upon a given piece of work, and when the tool is stationary or when the permissible "piece time" is exceeded, the recording pencil returns to non-production. A wide variety of switches, capable of infinite extension, covers every possible class of producing machinery, and the whole equipment affords a most valuable control over shop efficiency while greatly facilitating the computation of wages, bonuses, and piece-work rates. The recorder affords an indisputable record of the working of every power appliance in a works, is fair to both master and man, and costs about ½d. per day per machine to operate.

Messrs. D. H. Bonnella & Son, Ltd. (198, 217),
60, Mortimer Street, Cavendish Square, W.

The firm specialises in the hundred and one small sundries required in electric lighting and bell work, a feature of the stand being the display of electrical accessories for motor-car work.

In passing we may mention metal switch plates in attractive designs, also similar plates in non-inflammable imitation ivory; celluloid tokens for tramways; bells and indicators for hotel use, and bell pushes in great variety; connectors for railway and ship work; hand lamps; the Ampere cell, &c.

An attractive centre piece in this stand is the firm's illuminated table cloth with the special switches and fittings designed for use in

connection with it; it may be mentioned that the firm's Shadoless candle lamps are now provided with Osram filaments.

The "M. S." metal lamps, for which Messrs. Bonnella are agents, are shown, as well as samples of Terroid wiring, which is intended to meet the demand for metal-sheathed cable created by the introduction of certain special wiring systems, but has the advantage that no special fittings are required; the Terroid system employs an ordinary insulated cable with a bare outer wire, attached throughout its length by small wire binders, and the firm have the sole agency for this system.

In motor-car accessories, the firm's electric head lights, motor horns, direction indicators, &c., make an attractive display; they are now producing electrical goods to harmonise with almost any kind of interior furnishing in motor work, and are fitting Holophane globes, &c.

Messrs. Sessions & Sons, Ltd. (321),

Gloucester.

This firm is showing samples of enamelled and plain slate and Sicilian and Dove marbles, as supplied for switchboard panels and similar work. The marbles are very handsome, and well worth careful inspection.

Messrs. J. W. & C. J. Phillips (3),

23, *College Hill, Cannon Street, E.C.*

This exhibit consists entirely of examples of the well-known "Bristol" recording instruments for steam, vacuum and water pressure, electric pressure, current and power, and temperature. The last named are of two kinds—thermometers and pyrometers—and, like the others, record on flat circular charts.

Union Cable Co., Ltd. (181, 182),

Eagle Wharf Road, N.

The company's stand is near the main entrance, surmounted by its well-known five-section cable trade mark. The exhibit comprises specimens of cable for all classes of work. Prominent are a number of samples of power cables supplied to collieries; a '75 × '75 × '2 power cable with '3 7/18 pilots, for the Dundee Corporation; a 7/14 concentric paper and lead-covered 30,000-volt cable; and an 800-pair air-space lead-covered telephone cable.

Mention may also be made of a series of joint boxes for telephone work, also of joint boxes, cable-terminal boxes, &c., for power work. The company will shortly be manufacturing its specialities at Dagenham, where a new works covering some 10 acres is in course of construction.

"Lea" Recorder Co. (289),

28, *Deansgate, Manchester.*

The latest model of the Lea Recorder is on view at the above stand, in addition to one of the standard recorders and a large variety of weir plates, specimen charts, and so on. The integrating recorder consists essentially of a standard recorder with an extended pen shaft, the latter being controlled by a slotted drum gear-driven from the tank float. On this shaft extension there is mounted a recording or counting gear train driven by a toothed drum, rotated at constant speed by an eight-day clock. The toothed drum is cut away helically, so that according to the flow through the weir and the resulting lateral position of the counting gear box, the driving wheel of the counting train engages during no part, some part or the whole part of the revolution of the clock-driven drum. The integrator, of necessity, gives highly accurate results (which can, of course, be checked at leisure by planimetering the time-flow chart). The latest improvement in the integrator consists in the placing of the clock below the toothed drum and directly geared to the latter; this arrangement is simpler and yields better results than the earlier designs. By using a wooden or leaden tank and hard lead or glass weir plates, the "Lea" recorder can be used for recording the flow of acids and other corrosive liquids.

Exhibition Competitions.

To-morrow—the closing day of the Exhibition—is also the closing day of popular competition No. 2 (Parts I and II) arranged by the electric supply companies. Competitors in Part I have to select from the exhibits in the hall what they consider to be the best and most economical equipment, not costing more than £25, for an electric kitchen sufficient to provide a specified menu for a small dinner party. A description has to be prepared by the competitor in his own words, and on a plan the writer must indicate how he would dispose the apparatus in a kitchen which at present has an ordinary cooking range. The prizes offered are (1) the electric cooking apparatus selected in the description submitted; (2) electric cooking apparatus to the value of £10; (3) a reduction of £5 from the winner's next quarterly bill for electricity. Twelve other prizes consist of electric grillers, hot-plates, toasters, &c.

For Part II there has to be written a description of the apparatus chosen in Part I showing knowledge acquired as to method of construction, the operations of which the apparatus is capable, and the electricity consumed in various operations. The prizes here again are to take the form of apparatus (£10 and £5), and a reduction of 5os. in electricity bills, with a dozen others in the form of egg-boilers, hot-water jugs, cigar lighters, &c.

The particulars as to conditions can be obtained at the supply company's stand, or from Mr. F. J. Walker, at 19, Carnaby Street, Golden Square, W.

An Explanation.—In our issue of October 6th, p. 559, the exigences of space compelled us to publish an electric pocket lamp in close proximity to a Pope electric lamp, and we learn that in consequence Pope's Electric Lamp Co., of Hythe Road, Wimbledon, have been simply inundated with inquiries for pocket flash lamps. In their interests and at their request we desire to point out that Pope's Co. do not make these articles at all, but confine themselves to the manufacture of carbon and metal-filament electric lamps. When we repeat that Messrs. W. and R. Jacobs, of 39c, King William Street, E.C., *do* make these pocket flash lamps and are not the manufacturers of the Pope electric lamps, we think that the interests of all parties have been properly met.

CITY NOTES.

(*Continued from page* 654.)

British Electric Traction Co., Ltd.

An extraordinary general meeting of the shareholders of the above company was held on Tuesday, in the large hall of the Cannon Street Hotel, Mr. E. Garcke presiding, for the purpose of considering the much-discussed scheme for the sub-division and rearrangement of the company's capital.

The Chairman, in his opening speech, said that for the convenience of the shareholders the directors had made two departures from the customary procedure. They had issued full particulars of their proposals more than two months in advance of the general meeting at which they were to be discussed and voted upon, so as to allow shareholders time to obtain information and to fully consider the matter. The other departure was that, with the concurrence of the board, he had issued what was in the nature of a speech ten days in advance of the meeting. Whatever the views of the shareholders might be as to the merits or otherwise of the scheme which the directors proposed for their acceptance, he felt sure it would be admitted that the directors had put the scheme fairly before the shareholders, and that they had made an earnest endeavour to minimise the difficulties of the shareholders in deciding this question. The board were very desirous to maintain this attitude of fairness to all sections of the proprietary throughout the remainder of the proceedings, and he was most anxious that the meeting should be conducted with the strictest impartiality For the reasons set out in the memorandum he had issued, the directors felt that something ought to be done to adjust the altered relations between the two classes of shareholders which had been produced by the unfortunate circumstance that their profits were insufficient to pay the full preference dividend. The directors having given the whole position their most careful consideration, were of opinion that the scheme which had been formulated was the right solution. Having come to this decision, they felt it their duty to strongly advise the shareholders to accept their proposals. Complaint had been made that the scheme was complicated, but it must be remembered that the problem which had to be solved was a complicated one, and they could make the scheme less complicated only by ignoring some of the factors of the situation. Having stated his views on the subject pretty fully in the memorandum, which he had no doubt they had received, it would be unnecessary for him to occupy much of their time, as the opposite views of the preference and ordinary shareholders had been expressed by representative shareholders of each class, and the directors were in the fortunate position of hearing the strongest arguments in favour of the scheme stated by their opponents, for the arguments against the scheme which had been advanced by preference shareholders went to answer the objections to the scheme which had been urged by ordinary shareholders, and, on the other hand, the objections to the scheme which the ordinary shareholders felt were an answer to those preference shareholders who were of opinion that the scheme unduly favoured the ordinary shareholders. In the memorandum he had explained the present position in regard to the profits of the company and also the reasons why the profits were small in relation to the paid-up capital, but while they spoke of the smallness of their profits it was only right that they should clearly understand that they were small only in relation to the paid-up capital, and the point he would like to emphasise was that in this respect they were no worse off, but, on the contrary, they stood a little better than the average electrical undertakings in this country of the same class. In order to clearly understand the position of the company he would like them to fix in their minds certain figures mentioned in his memorandum. He there explained that their organisation consisted of 57 companies, with an aggregate capital of over £12,000,000 sterling. On that capital of £12,000,000 they earned last year net profit to the amount of over £622,000, representing an all-round average return of about 5 per cent., but of these profits only about £400,000 were distributed in interest and dividends, and £221,000 were applied to reserve funds or carried forward, so that the average net returns to the investors in these companies was 3¼ per cent. There was no denying that this return was low, but that was not the point they had to discuss that day. The business of the meeting was not to discuss the causes of the insufficiency of profits, or even the means of alleviating it, but to discuss the question of altering the existing relations between the two classes of shares, so as to overcome difficulties which that insufficiency of profits had produced. Of the capital of £12,000,000 represented by the companies in their

organisation, the British Electric Traction Co. held a little over £5,000,000, on which it received about £134,000 in interest and dividends last year. The percentage of profit on their £5,000,000 was a little less than the percentage of profit earned by the Associated Companies, but that arose out of the fact that the British Electric Traction Co. held a larger proportion of ordinary shares than of debentures and preference shares in those companies. The reason he had mentioned those figures was that they might understand the position which the British Electric Traction Co. occupied. The bulk of its profits must continue to be derived from the Associated Companies. It was to the improvement in the profits made by the Associated Companies that they had to look for improved results, and that they were steadily improving these was perfectly evident from the figures. Last year the Associated Companies collectively showed an increase in net profits of close on £100,000. That was no small achievement, and he hoped they would do still better this year. But that was not the only direction in which the position was being improved. The Associated Companies were steadily striving by negotiations with the local authorities and otherwise to improve the undertakings in respect to their capital values, but these improvements were not expressed in the balance-sheets. They did not increase the capital of an Associated Co. whose tenure had been improved, but these aspects must be taken into consideration if any valuation of this company's assets was contemplated, and that was where the real difficulty of making a valuation arose. They could not prognosticate even approximately what would be the result of pending and future negotiations by the Associated Companies. He would very much prefer to avoid entering upon any controversial matters, as he would like to be able to occupy a thoroughly impartial position in presiding over that meeting, but if he did not refer to the circular which had been issued from the offices of the Municipal Trust his silence would be liable to be misconstrued. He, therefore, proposed very briefly to reply to the main points raised in that circular. Referring to the second paragraph of the circular, he wished to point out that an interpretation had been put upon his words which he did not intend to convey. What he said was that the question of what proportion of the annual profits should be set aside for reserves could be better discussed after this scheme had been adopted, not, as suggested in the circular, that the question of depreciation could be better dealt with after the scheme had been carried. His reason for the statement he made was this: He was aware that the holders of the ordinary shares felt that while there was depreciation of assets the present rate of dividends on the preference shares should not be increased, even in the event of an increase in profits, and while they felt this it would be exceedingly difficult to discuss as a general principle the question of what proportion of the annual profits should be put to reserve, but if the interests of the two classes of shareholders in the distributable profits could be brought into unison, the objections of the ordinary shareholders to an increased rate of distribution on the preference shares would disappear, and they would then discuss the question of reserves to be made from year to year, without involving them in the larger discussion of the question of depreciation of capital. In the fourth paragraph complaint was made that they did not give an approximate idea of the depreciation. Well, they had stated repeatedly that to arrive at any truly approximate figure was the real difficulty of the situation as presented by the balance-sheet. He would like to make clear what he meant by the difficulty of making a true valuation of their assets. He did not refer to the small practical difficulties arising out of the work of making a valuation, but the difficulty was that they could not, with any degree of accuracy, forecast the future, and no experts, however able, could help them in this. It was suggested that they had the market values to go upon, but the market value of their shares and debentures had varied a million sterling during the year. It was clear, therefore, that the market values were not sufficient, even approximately, to be accepted as a basis for the future capitalisation of the company. It must be remembered that their assets were of a very special kind, and were subject to statutory and other conditions for which there was no parallel in any other industrial branch. In the fifth and sixth paragraphs of the circular a figure, which he mentioned merely by way of example or illustration, was made to appear as a definite statement of something which was certain to take place. Then the circular went on to point out that the divisible profits would have to be three times the amount distributed last year, in order that the holders of the ordinary shares might receive a dividend of less than 1 per cent. on their present holdings. But what was the position now? The preference shareholders had to receive four times as much in dividend as they received now, and then they were entitled to be paid the arrears to the extent of £266,000 before the ordinary shareholders could receive anything. The concession which the scheme made to the ordinary shareholders meant that when the preference shareholders received only 3¾ per cent. on their £10 shares the ordinary shareholders would receive nearly 1 per cent., and he did not think that that was a concession which could be accurately described as of no practical value. With regard to the question, "What amount of reserve ought, in the opinion of the board, to be set aside each year to meet the ordinary depreciation on the undertakings?" after each company had provided for its maintenance and renewals, the amount it should set aside for extraordinary contingencies, or, in other words, reserve, depended upon a consideration of all the circumstances of each case and largely upon the amount of profits which was available for that purpose. An explanation was required in the circular in regard to the amount of the reserve fund which was applied last year. The figures given in his memorandum were quite correct. Out of the net profits, amounting to over £600,000 for the year, an aggregate sum of £221,000 was placed to reserve by the various companies, and £169,000 was applied during the year, but not, as stated in the circular, for extraordinary expenses of the year out of the reserve of the year. The accumulated reserve funds of the Associated Companies amounted to £1,228,000, while the B.E.T. Co. had other reserves of £730,000, and it was out of the accumulated reserves that the sum of £169,000 was applied last year. These reserves were provided for these very purposes, but it was not correct to say when they applied accumulated reserves to writing down that such writing down was done out of the amounts reserved for that particular year. In reply to the third and last question as to how, in view of the admitted depreciation in the company's assets, dividends had been paid in the past, and how any dividends were to be paid in future until the lost capital had been made good, all he had to say was, that they had been definitely advised by leading counsel, and the law on the subject was clear, that a loss on capital account was not necessarily a loss which had to be made good out of revenue. There was no loss on the revenue account of the company, and there was no legal or practical reason why all division of profits should be stopped because the assets had depreciated in value. With regard to the amendment proposing the appointment of a committee, from a purely personal or selfish point of view the directors would welcome a committee of inquiry (cries of "why not have it"?), but their first consideration must be the interests of the company, and from that point of view they felt bound to advise the shareholders that the appointment of a committee of inquiry would do the company a great deal of harm (cries of "bosh" and "humbug"), because of the time it would take up, because of the dislocation it would cause to the business, and because of the injury it would do to the credit of the company. (Cries of "rubbish.") The proxies which had been lodged indicated that the directors enjoyed the confidence of the shareholders, and he understood that in view of the large support which the directors had received, the amendment for the appointment of a committee would not be moved. That being so, the directors were willing, after the first resolution had been carried, to agree to an adjournment of the proceedings for a fortnight, so as to allow time for discussing the situation with the representatives of the dissentient shareholders. He concluded by proposing the following resolution:—"That the scheme for a sub-division and rearrangement of the capital of the company submitted to this meeting be, and the same is hereby approved, subject to such modification, if any, as may be made and approved at the requisite extraordinary meetings of shareholders, and that the meeting stand adjourned till November 3rd next at 2.30 p.m."

Sir Charles Rivers Wilson formally seconded the resolution.

Mr. Lea Smith said he was a holder of 5 per cent. debentures and also preference and ordinary stock. They had had a good deal of literature on the subject, and had listened attentively to the speech of the chairman, but they had not heard from him what seemed to be the crux of the whole position, and this was the question of fares. The fact was, they were carrying the people at too low a rate. He would like to know what chance there was in the future of the company carrying people at a reasonable rate.

Sir A. Anderson said he approached the matter as the representative of the interests of the Anglo-American Debenture Corporation, which had a substantial holding in the ordinary shares, and also he was a constituent member of the committee which had been in communication with the ordinary shareholders with regard to this proposition. They had issued a statement to the shareholders with regard to the proposition which had been submitted, and on that they had obtained a substantial number of proxies. The directors had invited the members of that committee to meet them and discuss the situation, and as a result of that interview it was arranged that the motion to be submitted that day should be modified in such a way as to give an opportunity for the representatives of both ordinary and preference shareholders to meet the directors and discuss the scheme, with the object that they might ultimately be able to agree upon a scheme which they would recommend to their friends as one which ought to be carried out in the best interests of those concerned. In the ordinary way, he would have explained the views which the committee held, but in view of the suggestion to adjourn the meeting, he would say nothing now.

Mr. Alden said he had given notice of amendments which he had intended to move. He was strongly opposed to the scheme of reorganisation because it was in no way final; it conferred no benefit on either class of shareholders and no benefit on the company itself. He held that the capital should not be reduced, as it was impossible for experts to fix the capital value of the shares when a small increase of 5 or 10 per cent. in the fares would increase the capital value of most of the Associated Companies by 50 per cent. The only way to provide for the depreciation was when it was ascertained, and that would be when the local authorities took over the companies. He had intended to move amendments to the effect (1) that the preference shares remain 5 per cent. cumulative shares, but that all arrears of dividend be wiped out, and (2) that after the debenture interest had been paid a quarter of the profits should be set aside for the purchase of debentures in the open market. If, however, the board would give him the assurance that his views would be considered he would not move these amendents.

The Chairman: I understand that Mr. Alden does not wish to move his amendments if the directors give an undertaking that his views shall be carefully considered, and I will give that undertaking.

Mr. A. H. Cooper remarked that if the meeting was going to be adjourned, it was useless to waste time in discussing the scheme. Their shares had dropped from 13 to three-quarters, and he thought

it was quite time they had a Committee to thoroughly look into the affairs of the company.

Mr. Freeman said he was one of those unfortunate shareholders who, about eight or nine years ago, put a large sum of money into the company. The question for them to consider was, what was the value of their shares now? He would be willing to part with his shares for 25 per cent. of what he gave for them, but he doubted whether anyone present would be willing to buy them at that price even. He hoped the shareholders would not be satisfied with any plausible excuses of the directors, but would insist on knowing where the capital of the company had gone. There was one company—the Brush Electric—into which the B.E.T. had poured money like water, and he found that two or three of the directors of the latter company were also on the board of the Brush, so that they had the same directors selling from one company and buying in another. He did not think that was right. He contended that they wanted a separate directorate for all of the associated companies.

Mr. J. B. Braithwaite said he represented a large holding both in ordinary and preference shares, and he had endeavoured to look at the matter from both sides. The first point he wanted the shareholders to get into their heads, was that they were not there to discuss the affairs of a derelict concern. There had been too much of that sort of talk in certain sections of the Press. He would like to remind them that quite apart from their holdings in electrical undertakings the company possessed liquid assets amounting to a quarter of a million sterling, so that its financial position was a strong one. Their earnings last year were £166,000—not as large as they would like, but still they could not call a concern that was earning £166,000 a year a derelict or bankrupt affair. Then again, the associated companies had reserves of £1,228,000 and the B.E.T. itself had reserves of £641,331, to which they added £25,000 out of last year's profits, so that the concern altogether had reserves of £1,894,000. They were discussing the affairs of one of the largest and most important transport companies in the United Kingdom, and if they only had that coin which represented 1½d., instead of 1d., the company would be earning 10 per cent. on its ordinary stock. With regard to the scheme, it was a matter which they could discuss without any heat or any question that the brokers would be put in if they did not pass it. Taking, first, the case of the preference shareholders, they were asked, under the scheme, to surrender three-fourths of their cumulative rights from date, that was to say, that in future only £2 10s. of their £10 would be a 6 per cent. cumulative stock, but they retained their arrears, amounting to £266,000, although they would not get them until after the full dividend had been paid on the preferred ordinary stock. As a *quid pro quo* they were going to have their capital preferred in the event of liquidation or winding up, to the extent of 50 per cent. Whether or not it would turn out to their advantage he did not know. The Stock Exchange, which was supposed to be a fairly good index of these things, had shown what it thought of the scheme from the preference shareholders' point of view by advancing the price of the shares from £3 8s. 9d. to about £4. Whichever way they looked at the scheme as preference shareholders, he did not think they could do otherwise than support it heartily. As to the case of the ordinary shareholders, at the present moment the ordinary shares got nothing until the preference shares had received their full 6 per cent., and the whole of the arrears which had accumulated year after year to a very considerable extent. Under the scheme the whole of the existing arrears of £260,000 were proposed to be wiped away, and no future arrears were going to be accumulated. In addition they were to receive a dividend as soon as the full 6 per cent. had been paid on half the present amount of the preference shares. He was really astonished how any ordinary shareholder could say that the scheme was unfavourable to them, seeing that it brought them almost within sight of a small dividend. Therefore, as an ordinary shareholder, he welcomed the scheme, and again applying the market test, since the chairman's explanation of the scheme was published the ordinary shares had advanced from 20s. or 22s. 6d. to 30s. a share. In his opinion, the scheme was fair and equitable as between the two classes of shares. Those who were opposing the scheme, though they had had the details before them for the past two months, had so far failed to produce a better scheme, and that, to his mind, implied that they would do well to accept it as it stood. The opponents of the board said it was absolutely necessary to ascertain the depreciation in the company's assets, but that was absolutely impossible unless they could produce three or four prophets, or sons of prophets, who could ascertain what would be given by an arbitrator, 30 or 40 years hence in some cases, for their different undertakings. Any valuation that might be made would be the merest possible guesswork, and he thought the directors would be acting very unwisely if they yielded to any pressure on that point. He had hoped that after the long time which they had had in which to consider the scheme they would have voted upon it definitely that day. He felt sure it would be greatly to the advantage of the company and to the value of their shares if the scheme went through. The company's earnings were showing satisfactory signs of improvement, and if they could only get the scheme through he believed they would rapidly see the company regaining its prestige and its old position; and if some means could be devised of slightly increasing their fares—if a new coin of the value of 1½d. could be produced, he believed it would not be long before the company would once again be in a prosperous condition.

Mr. Bond wished to speak on behalf of his wife, but

The Chairman said he must wait until all shareholders had spoken.

Mr. Soames said that Mr. Braithwaite was evidently unaware that a considerable number of men had approached the board. The Committee had spent much time and money in this matter, and had only one object before them, which was the best interests of the company. The Committee proposed to examine into all these things, and the result of their investigations would, he hoped, be that a scheme would be propounded. Mr. Braithwaite said that the shares had gone up in the market on account of the general acceptance of the scheme by the shareholders, but he differed from that view. Many purchasers opposed to the scheme bought shares because they felt that some alternative scheme would be put forward and carried by the shareholders. A number of gentlemen had written to the Press and said they were wreckers, but their action was justified by the number of proxies received. If the shareholders allowed the Committee to confer with the board, and produce a scheme suitable to all parties, there was no reason why the company should not have a bright future before it.

Mr. Baldwin said he was a holder of both preference and ordinary shares, and he did not think the preference shareholders ought to be asked to give up so much of their preferential rights. The board ought not to tamper with the essential rights of the preference shareholders.

Mr. Fells said he thought the scheme did but the barest justice to the preference shares. The Committee seemed to be largely composed of ordinary shareholders, and he hoped they would not have such influence with the board that the interests of the preference shareholders would be prejudiced. He agreed that it was impossible to form any idea of what the value of the assets of the undertaking were, as it depended on a variety of causes operating over a long series of years. He hoped there would be no question of the reduction of capital, because if there was the board would naturally wish to make the reduction considerable, so as to pay large dividends on it, and any accretions to the preference capital would benefit the ordinary shareholders.

Mr. Chalmers (Liverpool), as a large preference shareholder and representing others, said he had it on good authority that it was impossible for the board to carry their resolutions that day, and therefore it was only waste of time keeping busy people there. He suggested that the chairman should give them the names of the Committee, and then take a vote as to the meeting being adjourned.

Mr. Cantler said it was all very well for Mr. Braithwaite to tell them the good position the company was in, but what puzzled him was how they were going to get more income. He thought the transport companies would have to combine together to increase the fares, and by that means make a success of a company which had done much excellent work, and which had been so much pushed aside by local boards.

Col. Bates remarked that he was the owner of 200 preference shares. Although many things had been discussed, one matter seemed to have been lost sight of, and this was whether the preference shareholders were going to consent to have their interest "scaled" down. When they talked of interfering with the rights of preference shares, it seemed to him they were approaching very nearly to the border line between honesty and dishonesty.

A Shareholder asked if the preference shareholders would be represented at the conference with the board.

The Chairman said he did not wish to intervene in the discussion, but they had had some references made to the appointment of the Committee, and he wished to make it perfectly clear what the position was. Mr. Chalmers had expressed the opinion, on what he called good authority, that they could not pass the resolution. He had already told them that the proxies the directors had received, not only indicated that the directors enjoyed the full confidence of the shareholders, but, he believed, were more than amply sufficient to carry the resolution they had to deal with in the first instance. But the directors recognised that the dissentient shareholders were pretty numerous; therefore they thought it right that the representatives of the dissentient shareholders, both ordinary and preference, should have the opportunity of meeting the directors and discussing the situation with them, and therefore the directors, instead of forcing the resolution through at that meeting, which they would be perfectly justified in doing, considering the mandate they had received from the shareholders all over the country, suggested that the meeting should be adjourned for 14 days in order that the board might invite representatives of the dissentient shareholders to meet them. It would not be a formal committee, but the board would of their own volition invite these gentlemen. It might help matters if he said who would represent the preference shareholders. They were not very particular, but they thought it better to ask those gentlemen to whom proxies had been given, and so if Mr. Chalmers would accept the invitation they would be glad to see him. They would also be glad to invite Mr. Soames, but it was only right that they should know that Mr. Soames had accepted a position in the company, and was giving them the benefit of his services as a director of some of the associated companies. He did not think he could carry it any further. He did not wish to keep them there, but they were the servants of the shareholders, and they could sit there as long as they wished to discuss the matter.

A Shareholder asked what were the proportions of preference and ordinary proxies which the board held.

The Chairman said he understood the point of the speaker was that the ordinary shareholder would support the scheme, but not the preference shareholders. Let him tell them quite plainly that the proxies which the directors had received from the preference shareholders would enable the resolution to be carried by an overwhelming majority.

Replying to Sir R. Anderson, the Chairman said the ordinary shareholders who would be invited were Mr. Alfred Shepherd, Mr. Duke and Mr. W. Parker.

Mr. Braithwaite again raised the question of the proxies sent to the board being available for a modified scheme, and

Mr. Morse, solicitor, said a proxy could be withdrawn. If the scheme was substantially modified, notice would have to be given to the shareholders. All the proxies would be valid for this same meeting.

Mr. Chalmers pointed out that there were three ordinary shareholders and only two preference shareholders named.

The Chairman said the board would invite three of each.

Mr. Bond raised the point of whether he was to be allowed to speak, and

The Chairman took a show of hands, which resulted in a majority for allowing him to speak.

Mr. Bond said he was the organising secretary of the British Electric Traction Shareholders' Association, and he asked where the £641,000 reserve was.

The Chairman said that the balance-sheet showed where it was.

Mr. Bond: They do not understand the balance-sheet.

The Chairman explained that the balance-sheet gave all the items.

Mr. Hayes asked for an explanation of the chairman's explanation.

The Chairman said the reserve was invested in the business of the company. It was in the investments of £5,200,000.

Mr. Bond: It is no reserve at all.

The Chairman remarked that at the next meeting he would probably have something to say on the subject of fares. With regard to Mr. Freeman's complaint that he considered it absolutely wrong that the directors of the B.E.T. should be directors of the Brush and other companies, he (the chairman) thought it was an essential part of their duty to look after their various investments, and the directors of the B.E.T., who were directors in the associated companies, were acting in the interests of this company, and, indeed, he should consider that they were neglectful of their duty if they left those large investments to others.

On a show of hands, 110 voted for the resolution, which the Chairman declared carried by an overwhelming majority.

Grindell-Matthews Wireless Telephone Syndicate, Ltd.

Sir W. Bull presided at the first ordinary general meeting, held the other day at Winchester House, E.C. He said, in moving the adoption of the report, that one of the things that the late Sir Clifton Robinson especially wanted him to look after was this Grindell-Matthews invention, therefore he became chairman. A large amount of experimental work had been carried out at their depôt at Pilning, on the River Severn. They were delayed by a flood sweeping away some of their instruments last autumn, so that they had to begin again. In January last they had to obtain further funds to carry on the experiments, and an eminent engineer was consulted, who sent Mr. Simkins down to prepare a report. The general and original shareholders did not seem inclined to put any more money into the concern, so the directors obtained capital from other sources. In regard to the negotiations for the sale of the syndicate's property, while it was not desirable to go too closely into detail, he ought to say that a finance company had agreed to provide further capital to complete their experiments. They had been given an option to take up the balance of the unissued capital of the syndicate, and the board had received intimation that the option to purchase at £150,000 would be exercised, provided certain tests now in hand were satisfactorily completed, as Mr. Grindell-Matthews said they would be. This would give the shareholders in the syndicate £7 10s. for each of their £1 shares. The short-distance experimental work being now practically finished, the Pilning depôt was being removed to London, where the larger instruments were being prepared for long-distance tests. Options had been granted in respect of various foreign patents, in one case the purchase price being £33,000 in cash or shares, at the option of this syndicate, and £50,000 each for the others. Therefore, although they had not been as rapid as they had hoped, on the whole he thought he could present to them a fairly satisfactory report. Mr. Grindell-Matthews had worked extremely hard at his invention, and, of course, if it fructified in the way they hoped, namely, that they could increase its distance from 40 to 50 miles, it would mean that it would revolutionise the whole of the communication in this country The advantage of a system by which they could telephone through the air must be manifest to them all.

A Shareholder asked Mr. Grindell-Matthews to tell them something which would arouse their enthusiasm.

Mr. Grindell-Matthews, in reply, said that the conditions laid down by the company which had the option to purchase had already been complied with, and it only remained for him to carry them out before their experts.

Drake & Gorham, Ltd.

Mr. B. M. Drake presided at the annual meeting, held at 66, Victoria Street, S.W., on October 11th, and in moving the adoption of the report (see Electrical Review, October 6th), he said that there had been a considerable increase in the turnover of all sections of the business. Severe competition, however, still continued, and it was at times difficult to get people to appreciate that if they accepted a lower tender they would not necessarily be getting the same quality of material and workmanship, for, as results proved, the profit at which they undertook work was very reasonable, their turnover being in excess of the nominal capital of the company. They had been told that their firm had a reputation for doing very good work, but that they were expensive. There was as much scope for variation in prices in electric lighting as in anything he knew, but their policy to maintain, at all costs, their reputation for a high standard of excellence would remain unaltered, for it was constantly brought home to them, after 30 years' experience, that the best work was the cheapest in the end. The item of stock might appear large, but they must be in a position to deliver promptly. They had dealt liberally with the question of depreciation of stock. The chairman proceeded to give a list of those for whom they had carried out orders during the year, and he added that they had still a considerable amount of work in hand for important clients. They started this year with an increase of nearly £5,000 worth of orders on the books. The speaker next referred to the lack of support given by shareholders in the way of influence and orders, and to the increase in the petrol-gas department, gas having proved a useful adjunct to electric lighting installations where coal gas had formerly been used for cooking. The factory showed considerable increase in profits, electrical apparatus having been made for the Government and the trade.

Mr. J. C. Forster seconded the motion, which included the payment of 4½ per cent. dividend, and it was carried unanimously.

Monte Video Telephone Co., Ltd.—The directors' report for the year ended July 31st last, states that after providing for all charges in Monte Video and London, the net profit for the period is £22,145, as against £20,564 for the previous year. The interim dividends paid on May 1st last absorbed £4,343, leaving a balance of £17,802, to which is added £3,921 brought forward, making an available balance of £21,724. After applying £13,000 to depreciation of the company's property and plant, the directors recommend the payment of final dividends of 2½ per cent. upon the preference shares, and 3 per cent. upon the ordinary shares, making for the year 5 per cent. on the preference, and 6 per cent. on the ordinary shares, leaving a balance of £4,381 to be carried forward. The number of new subscribers during the year has shown a substantial increase. During the year the chairman paid a visit to Monte Video and inspected the company's system, both in the city and the country. Acting under powers conferred by the board he appointed a local board, consisting of Dr. A. Rodriguez Larreta, who has been legal adviser and representative of the company for many years, and Mr. Charles W. Bayne, general manager of the Central Uruguay Railway Co., of Monte Video. This arrangement should prove advantageous to the company.

National Telewriter Co., Ltd.—The report for the year to May 23rd, which was submitted at the meeting held on Monday in London, states that the operations of the company have been considerably hampered owing to technical difficulties which have arisen, and the directors decided towards the close of 1910 to suspend further efforts to obtain subscribers until these difficulties have been overcome. With this object arrangements have been entered into with the owners of the American patents, which secure for this company the full benefit of the wide technical experience of the American company, as well as supplies of the latest type of American instruments, of which a limited number has been ordered and are being installed in London and elsewhere. The contract department has been reopened and canvassing resumed under the supervision of an experienced telephone contract officer. The City Telewriter Exchange continues to make progress, and a small West End exchange has been opened, with a view to facilitating intercommunication between West End and City firms.

Our summary of the meeting is unavoidably held over.

STOCKS AND SHARES.

Tuesday Evening.

The various foreign political complications, excepting Chinese, appear to be gradually straightening themselves out, and the Stock Exchange markets have been making progress towards recovery under the cheering influence of a sharp rise in Consols. Amongst the leading features of the domestic departments, the rise in Home Rails stands out particularly; and, speaking generally, the tone all round shows more confidence, although the Stock Exchange has been so hit during the past nine months by one occurrence after another that it is not surprising to hear members ask "What next?"

In the Home Railway market the feature has been a rise of 1½ in City and South London Ordinary. A demand for a few thousands stock coming upon a market slenderly supplied proved all that was necessary to bring about the advance. Metropolitans put on a point, and Districts rose 1¼, in sympathy with the better tone all round the House. On the other hand, Metropolitan 3½ per cent. Preference declined 1, and District 4 per cent. Debenture lost a similar sum, although Underground Electric Railways 4½ per cent. bonds at par middle are a point to the good.

There was a good deal of dealing and very considerable interest taken in British Electric Traction issues right up to the time of the meeting. In addition to the circulars already sent out, came another last week asking for proxies against the scheme from the British Electric Traction Shareholders' Association, Ltd., saying that proxies must in all cases be accompanied by a subscription to carry on the work of the Association. The circular started with extracts

from five different newspapers, and went on to say that there must be "loyalty to the cause. If one thinks to put his little load on the shoulders of another, defeat is certain, for all may think the same."

The market view of the directors' scheme was none too favourable at the time that the letter was formulated, but, upon consideration, some of the principal dealers arrived at the conclusion that it was the best which could be expected in the circumstances, and they expressed their intention of supporting the board. The more the matter became studied, the more difficult was it to see how all the conflicting interests could be harmonised on a fair basis to all of them. The mere fact that various classes think that they are being unfairly treated, one at the expense of another, is used by some as an argument to demonstrate that the directors' scheme is, at all events, a sincere effort towards drawing up an equitable arrangement. Probably the outcome of to-day's meeting will be a compromise, and it is well that the various dissentient parties are to have the opportunity for quiet discussion, face to face.

The prices of the Ordinary and Preference shares on the week have fallen ⅛, but the Debenture stocks rose 1 each. It has been pointed out in the Press that the company's 4½ per cent. Second Debenture, yielding 5¾ per cent. on the money, is anomalously low as compared with the ordinary stocks of certain foreign railways, but these comparisons are somewhat dangerous; while, as in the case of a good many anomalies, the true inwardness is not difficult to discern when the matter is more closely explored.

The market in English Electricity Supply shares is no better, either as regards the volume of business or the trend of prices. St. James's Ordinary have fallen to 8½, Edmundson's Ordinary to 10s., and South London Ordinary to 2 1/16. The only rises in the list have been secured by Oxford Ordinary, and Bournemouth Second Preference, where the shares gained ⅛ each.

From the merely market point of view, the Exhibition at Olympia cannot be called a success. The shares of the London Companies have not benefited so far in any way. This is hardly as it should be, and looking at the Exhibition simply from a layman's standpoint, it must be confessed that the leading London companies seem to have missed a fine opportunity for further educating the public in the uses to which electricity can be put. We were glad to see that the conference of chief officials of the London companies did at last make, although late in the day, their stand of some practical use, but that it might have been much more valuable as a business proposition, possibly others besides the simple layman may be constrained to agree.

In the Telegraph list, the outstanding features are Anglo-American Telegraph Deferred stock and Marconi shares, both of which show substantial rises on the week. The jump in Anglo "A" is no less than 1⅛, and is due to the change of sentiment in the American market, where the view is now taken that there will be nothing much to fear from Government interference with the alleged trusts. This considerably frightened the many bears of the Anglo-American stock who had sold short and were unprepared for the little rush of buying. They have been badly caught, and it is their purchases that have materially assisted the big rise. The Preferred stock, allowing for deduction of the 30s. dividend last week, is a little better, while the Ordinary at 68½ has recovered the dividend of 15s. and another 10s. in addition. Direct United States shares have been bid up in sympathy, although the nominal quotation shows no change. West India and Panama Ordinary are also better, speculation being revived in them. The rest of the telegraph market is steady, but the changes are mainly due to dividend deductions. Great Northern Telegraphs at 31 are 5s. up, the Chinese disturbances being considered likely to promote traffics. Cuba Submarines are unchanged on the issue of a good report, closely akin to that of last year. The dividend is maintained at 6 per cent.

Marconis rose to 50s., and still the bulk of the buying comes from Ireland. Rumour, however, is very busy with the progress which the company is declared to be making, and the insiders say that the rise is justified—upon which point it is impossible for anyone not having first-hand information to express an opinion. The company proposes to make a fresh issue, to take the shape of 250,000 ordinary shares. American Telegraph and Telephone capital stock has regained most of its dividend, and New York Telephone bonds are a little better. The National Telephone septet is very quiet again, business having rather died down in the Deferred stock and the Third Preference shares. Monte Video Preference rose 1/16, the company's report being regarded with satisfaction.

The Mexican group is decidedly good. Demand has run most strongly upon the bonds, the floating supply of which is again becoming absorbed. The Common stocks, however, are also better—Mexican Light and Power, for instance, showing a rise of 1½. Mexican Tramways Common shares put on 1¼, while both classes of the company's bonds have improved. Rio Trams rose 1, allowing for the dividend, and the First Mortgage Bonds at 102½ are rather higher. The rise of 4½ in Sao Paulo Trams last week has been followed by a further jump of 3½ this week, so that the price now stands at 182½, while the First Debenture stock at 106 shows a gain of 1½. Montreal Light and Power has held its improvement, but there is no further change in the price. Shawinigan gained a point, and there has been a good demand for the company's 4½ per cent. Debenture stock and for West Kootenay 6 per cent. Gold Bonds. Other changes in this section are mostly to the good. Anglo-Argentine Tramways are a trifle easier, and La Plata Electric Preference are nominally down.

The Manufacturing division is very steady. There has been a little selling of Babcock Ordinary, which reduced the price 1/16. Beyond this there have been no changes worth mentioning, but it may be observed that the Rubber market is very dull, prices having given way upon the continued sagging of the raw material.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight.		No. of wks.	Total to date.		Route miles open.	Inc.
		£	£*		£	£*		
Aberdeen	Oct. 11	2,804	+ 31	19	30,792	+ 1,736	..	..
Ayr	,, 14	427	+ 25	22	8,912	+ 39	8	..
Bath	,, 14	1,582	— 79	41	35,216	+ 980	..	..
Birkenhead	,, 16	2,908	+ 66	28	33,080	+ 1,221	13·7	..
Birmingham Corp.	,, 7	19,163	+4,745	27	223,785	+39,401	56·4	..
Blackburn	,, 11	2,334	+ 92	28½	34,348	+ 2,988	14·6	..
Blackpool Corp.	,, 12	2,261	+ 145	..	52,935	+ 7,069	..	..
Blackpool-Fleetw'd	,, 14	1,187	+ 109	15	22,796	+ 2,007	..	..
†Bolton	,, 8	2,566	+ 148	28	71,238	+ 4,831	26	..
Bournemouth	,, 11	3,338	+ 35	28	64,855	— 1,121	22	..
Bradford	,, 7	10,484	— 437	27	153,887	+11,097	56	1
Brighton	,, 15	1,918	— 46	28	32,898	+ 2,042	9·5	..
Bristol	,, 13	12,557	+ 544	..	..	..	..	..
Brit. Elec. Trac. Co.								
Airdrie	,, 6	471	— 4	40	8,780	+ 50	3·65	..
Barnsley	,, 6	385	+ 21	,,	7,415	+ 517	..	..
Barrow	,, 6	662	+ 136	,,	12,477	+ 1,582	5·37	..
Devonport	,, 6	1,027	+ 130	,,	20,076	+ 2,955	8·85	..
Gateshead	,, 6	2,178	+ 57	,,	41,769	+ 2,317	11·25	..
Gravesend	,, 6	440	— 10	,,	8,659	+ 278	6·5	..
Greenock	,, 6	1,498	+ 235	,,	29,315	+ 3,914	7·25	..
Hartlepool	,, 6	572	+ 47	,,	11,132	+ 984	6·72	..
Kidderminster	,, 6	201	— 89	,,	4,869	+ 288	..	..
‡Leamington	,, 6	324	— 6	,,	7,224	+ 481	..	..
Merthyr	,, 6	414	— 11	,,	8,439	+ 117	2·9	..
Metropolitan	,, 6	17,981	+1,355	,,	355,195	+53,871	22	..
Middleton	,, 6	648	— 4	,,	13,951	+ 1,158	9·5	..
Mid. Joint Com'tee	,, 6	8,865	—3,928	,,	217,558	—14,188	..	..
Oldham—Ashton	,, 6	1,172	+ 23	,,	23,102	+ 344	9·13	..
Peterborough	,, 6	314	— 20	,,	5,266	+ 515	5·31	..
Potteries	,, 6	4,367	+ 406	,,	77,589	+ 7,377	29	..
Rothesay	,, 6	344	— 14	,,	9,683	+ 68	2·75	..
Southport	,, 6	563	— 45	,,	12,604	+ 485	8·17	..
S. Metropolitan	,, 6	1,703	— 149	,,	35,438	+ 1,917	..	..
Swansea	,, 6	2,286	+ 63	,,	46,196	+ 2,720	12·5	..
Tynemouth	,, 6	421	— 44	,,	11,588	+ 436	3·75	..
Weston-s-Mare	,, 6	358	+ 1	,,	7,850	+ 1,016	3	..
‡Worcester	,, 6	578	— 39	,,	12,126	+ 582	5·75	..
Wrexham	,, 6	212	— 16	,,	4,102	+ 183	..	..
Yorks. Wool. Dist.	,, 6	2,100	— 94	,,	42,396	+ 2,809	17	..
Miscellaneous	,, 6	411	+ 8	,,	9,266	+ 525	..	..
Burnley	,, 14	2,941	+ 264	..	..	..	11·7	1
Burton-on-Trent	,, 15	582	+ 22	28	8,458	+ 350	6·6	..
Bury	,, 15	2,522	+ 88	24	37,620	+ 3,295	23·5	..
Cardiff	Sept. 24	4,861	+ 240	25	64,551	+ 5,549	..	..
Chatham and Dist.	Oct. 12	1,666	— 292	41	35,510	+ 26	15	..
Cork	,, 12	916	— 45	41	20,802	+ 652	9·9	..
Croydon	,, 6	3,503	— 91	27	31,089	+ 3,946	11·7	..
Darlington	,, 14	433	+ 14	29	6,472	+ 638	..	..
Darwen	,, 13	521	+ 3	28	7,716	+ 623	4·36	..
Dover	,, 14	478	+ 43	28	8,036	+ 1,214	4·76	..
Dublin	,, 13	11,230	+ 327	..	100,047	+10,408	54·2	..
Dundee	,, 11	2,339	— 232	21⅞	25,833	— 612	15	..
East Ham	,, 14	2,106	— 30	28	31,406	+ 1,609	7·27	..
Exeter	,, 13	655	— 17	28	10,378	+ 798	5·5	..
Glasgow	,, 14	40,445	+2,616	..	373,737	+24,697	98	·75
Hastings	,, 12	1,920	— 99	..	..	..	..	..
Huddersfield	,, 14	3,782	+ 226	28	56,640	+ 6,470	29·5	1
Hull	,, 14	6,947	+ 81	28	81,742	+ 3,792	14·5	..
Ilkeston	,, 12	262	— 22	28	3,796	+ 89	..	..
Ipswich	,, 14	805	— 47	28	13,734	+ 801	10·5	..
Kilmarnock	,, 7	316	— 1	21	3,646	+ 327	4·25	..
Lancashire United	,, 11	2,662	— 61	41	55,824	+ 1,771	89	..
Leeds	,, 14	15,021	+ 387	28	215,946	+14,501	108	..
Leicester	,, 14	5,141	+ 137	..	..	..	..	..
Leith	,, 14	1,205	— 64	21⅛	15,194	+ 1,087	8·7	..
Liverpool	,, 7	23,782	+1,093	40	458,562	+13,666	116	9·5
†L.C.C.	,, 4	86,633	+ 585	..	1,195,724	+67,924	141·6	9
London United	,, 14	11,842	— 970	..	273,686	+ 9,577	..	..
Lowestoft	,, 14	398	+ 14	2	398	— 27	3·5	..
Manchester	,, 14	32,718	+1,401	28	462,886	+25,388	183	..
Newcastle	,, 14	8,551	+ 650	..	121,497	+ 8,873	14·5	..
Newport	,, 7	1,847	— 46	27	19,853	+ 885	14·5	..
Oldham	,, 15	3,986	+ 249	29	57,007	+ 2,409	28·75	·5
Pontypridd	,, 14	838	+ 29	28	11,846	— 42	5·5	..
Portsmouth	,, 7	4,196	+ 197	27	67,457	+ 5,946	15·25	..
Preston	,, 11	1,520	+ 63	28	22,556	+ 1,702	..	..
Rotherham	,, 12	1,362	+ 36	28	19,241	+ 1,597	12	..
Salford	,, 9	9,624	— 41	27⅞	136,076	+ 6,235	..	..
Sheffield	,, 17	12,945	+ 604	..	187,262	+12,143	40	..
Southampton	,, 11	2,357	+ 98	28	36,387	+ 4,648	22	..
Southend-on-Sea	,, 11	1,188	+ 16	28	22,644	+ 3,407	..	..
South Shields	,, 14	1,162	+ 39	28	18,354	+ 2,028	..	..
Swindon	,, 11	316	+ 8	..	4,627	+ 524	..	..
Tyneside	,, 11	920	+ 111	15	8,136	+ 1,058	..	..
Wallasey	,, 14	2,065	+ 188	28½	31,911	+ 4,932	..	..
Walthamstow	,, 14	1,851	— 88	28	23,650	+ 1,607	9	..
West Ham	,, 5	5,270	+ 97	27	74,817	+ 7,006	15·25	..
Wolverhampton	,, 11	1,964	+ 5	28	28,249	+ 1,725	25	..
Cen. London Rly.	,, 14	10,285	— 859	15	67,127	—12,747	6·32	..
City & S. Lon. Rly.	,, 15	6,436	+ 154	15	46,175	— 202	7·25	..
Dublin-Lucan Rly.	,, 15	295	+ 9	15	2,557	— 32	7	..
G.N. and City Rly.	,, 14	2,921	+ 89	15	20,534	+ 378	3·5	..
L'pool Overh'd Rly.	,, 15	2,994	+ 251	..	23,127	+ 1,251	6·8	4·3
Llandudno-Col. Bay	,, 13	462	+ 35	45⅛	14,398	+ 557	..	..
London Elec. Ry. Co.	,, 14	27,400	+1,070	15	180,380	+ 4,090	21·25	..
Mersey Railway	,, 14	4,123	+ 91	15	27,994	— 1,597	4·5	..
Metropolitan Rly.	,, 15	34,288	+ 194	15	248,354	— 5,155	24·5	..
Met. District Rly.	,, 14	22,276	+1,384	15	160,686	+ 7,095	24	..
Anglo-Argentine	,, 14	100,827	+6,717	..	2,000,041	+180,705	..	..
‡Auckland	Sept.	15,905	+1,810	3	48,372	+ 3,617	23·3	·3
Bombay (B.E.T.)	Sept. 15	5,887	+ 387	37	105,182	+ 6,303	..	..
‡Brisbane	August	24,650	+2,700	8	163,590	+18,735	..	..
Brit. Columbia Rly.	..	..	..	..	..	..	..	..
Calcutta	Oct. 14	7,235	— 801	..	..	..	..	..
Cape Electric T.Ld.	..	..	..	..	..	..	..	..
‡Kalgoorlie, W.A.	Sept.	3,891	..	..	31,528	..	20·5	..
‡Lisbon	..	..	..	..	..	..	..	..
Madras	Oct. 15	1,489	+ 43	..	28,141	+ 2,340	..	..
‡Montevideo	Sept.	23,946	+1,886	11	273,519	+16,540	..	..
Perth (W.A.)	Oct. 13	2,421	+ 848	..	65,973	+14,997	29	..

* Compared with the corresponding period of 1910. † One week only.
‡ Includes horse, steam and other receipts. ‖ One month.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for 1909.	Dividends for 1910.	Closing Quotations Oct. 17th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bournemouth & Poole, Ord.	10	5⅛	5⅛	7⅜ — 8⅜	..	6 5 9
Do. 4½ % Pref.	10	4½	4½	8¾ — 9¾	..	4 12 4
Do. Second 6 % Pref.	10	6	6	10½ — 10¾	+ ⅛	5 11 7
Do. 4½ % Deb. Stock	Stock	4½	4½	101 — 103	..	4 7 5
Brompton & Kensington, Ord.	5	10	10	7⅜ — 8⅛	..	6 8 1
Do. 7 % Cum. Pref.	5	7	7	7⅜ — 7⅝	..	4 7 6
Central Electric Supply, 4 % Guar. Deb.	100	4	4	99 — 102	..	3 18 5
Charing Cross, West End & City	5	5	5	3⅝ — 4⅛	..	6 1 3
Do. 4½ % Cum. Pref.	5	4½	4½	4⅜ — 4⅞	— 1/16	4 14 9
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	3⅞ — 4⅛	..	5 5 11
Do. Do. 4 % Deb.	100	4	4	94 — 98	..	4 1 8
Chelsea, Ord.	5	4¼	5	3⅞ — 4⅜	..	5 14 3
Do. 4½ % Deb.	Stock	4½	4½	98 — 100	..	4 10 0
City of London, Ord.	10	7	7	12 — 12½	..	5 12 0
Do. 6 % Cum. Pref.	10	6	6	11¾ — 12⅛	..	4 14 1
Do. 5 % Deb.	Stock	5	5	119 — 123	..	4 1 4
Do. 4½ % Second Deb.	100	4½	4½	100 — 103	..	4 7 5
County of Durham, 5 % First Mort. Deb.	Stock	5	5	89½ — 91½	..	5 9 3
County of London, Ord.	10	5	5	7⅜ — 7¾	..	6 7 0
Do. 6 % Pref.	10	6	6	10⅜ — 11⅛	..	5 6 8
Do. 4½ % Deb.	Stock	4½	4½	108 — 110	..	4 1 10
Do. 4½ % Second Deb.	Stock	4½	4½	100¼ — 103½	..	4 7 0
Edmundson's, Ord.	5	Nil	Nil	3/16 — 5/16	— 1/16	Nil
Do. 6 % Cum. Pref.	5	Nil	Nil	2 — 2½	..	Nil
Do. 4½ % First Mort. Deb.	100	4½	4½	83 — 86	..	5 4 8
Folkestone	5	5⅛	6	4⅜ — 5	..	6 0 0
Do. 5 % Cum. Pref.	5	5	5	4⅝ — 5⅛	..	4 17 7
Do. 4½ % First Deb.	100	4½	4½	96 — 98	..	4 11 10
Hove	5	8½	9	5⅞ — 7½ xd	+ 1/16	6 4 2
Kensington & Knightsbridge, Ord	5	8	9	6⅞ — 7⅛	..	6 0 0
Do. 4 % Deb.	Stock	4	4	91 — 93	..	4 6 0
Kent Elec. Power, 4½ % Deb.	Stock	4½	4½	80 — 84	..	5 7 2
London Electric, Ord.	3	2	2	1⅝ — 2	..	3 0 0
Do. 6 % Pref.	5	6	6	4⅜ — 4⅞	..	6 8 1
Do. 4 % First Mort. Deb.	Stock	4	4	89 — 93	..	4 7 0
Metropolitan	5	5	5	3¾ — 4	..	6 5 0
Do. 4½ % Cum. Pref.	5	4½	4½	4⅛ — 4⅜	..	4 14 9
Do. 4½ % First Mort. Deb.	Stock	4½	4½	100 — 105	..	4 5 9
Do. 3½ % Mort. Deb.	Stock	3½	3½	84½ — 87½	..	4 0 0
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	96½ — 98½	..	4 11 8
Newcastle-on-Tyne	5	4	4	3½ — 4	..	5 0 0
Do. 5 % Pref., Non. Cum.	5	5	5	4 — 4½	..	5 11 1
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	99 — 102 xd	..	4 18 0
Notting Hill	10	7½	8	.. — ..	..	..
Oxford	5	7	7½	6⅛ — 6⅜	+ ⅛	5 9 5
St. James' and Pall Mall, Ord.	5	10	10	8⅛ — 8⅜	— ⅛	5 14 3
Do. 7 % Pref.	5	7	7	6⅜ — 7⅛	..	4 16 7
Do. 3½ % Deb.	100	3½	3½	85 — 87	..	4 0 6
Smithfield Markets, Ord.	5	Nil	Nil	1⅜ — 1⅝	..	Nil
South London, Ord.	4	5	5	2⅛ — 2⅜	— ⅛	6 19 2
Do. 5 % First Mort. Deb.	100	5	5	98½ — 101½	..	4 18 6
South Metropolitan, 7 % Pref.	1	7	7	1⅝ — 1⅞	..	5 17 11
Do. 4½ % First Deb. Stock	100	4½	4½	95 — 98	..	4 11 10
Urban, Ord.	5	5	5	½ — 1	..	..
Do. 5 % Cum. Pref.	5	5	5	2 — 2½	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	86½ — 89½	..	5 1 8
Westminster, Ord.	5	10	10	7⅜ — 7⅞	..	6 7 0
Do. 4½ % Cum. Pref.	5	4½	4½	4⅛ — 5⅛	..	4 3 9

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5½ — 5⅝	..	5 6 8
Calcutta, Ord.	5	8	8½	6⅝ — 7⅛	..	5 19 4
Do. 5 % Pref.	5	5	5	5 — 5⅛	..	4 10 11
Calgary Power, 1st Mort. Bds.	100	5	5	96 — 98	..	5 2 0
Canadian Gen. El. Com.	$100	7	7	106 — 109	..	6 8 5
Do. 7 % Pref.	$100	7	7	118 — 122	..	5 14 9
Cordoba Lt., Power and T., Ord.	1	2	3	23/32 — 27/32	— 1/32	3 11 1
Do. 5 % Deb.	100	5	5	92 — 95	..	5 5 3
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	..	6	94 — 96	..	6 5 0
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	84½ — 87½	..	5 14 3
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	88 — 90	..	5 13 8
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	Nil	1/16 — 1/8	..	Nil
Do. 6 % Pref.	1	6	6	1/16 — 1/8 xd	..	8 14 6
Kaministiquia Power, 5 % G. Bs.	$500	5	5	101½ — 103½	..	4 16 7
Madras, Ord.	5	Nil	..	2⅜ — 3⅜	+ ⅛	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	95 — 97	..	5 3 1
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	86½ — 88½	..	5 13 0
Mexican Lt. & Power, Common	$100	4	4	86½ — 88½ xd	+ 1½	4 10 11
Do. 7 % Cum. Pref.	$100	7	7	105 — 107 xd	+ ⅜	6 7 3
Do. 5 % 1st Mort. Gold Bds.	..	5	5	95 — 97	+ 1	5 4 2
Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	90 — 92	..	5 8 8
Montreal, Lt., H. and Power	$100	6	7	170 — 175	..	4 0 0
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	5	84 — 86	..	13 17 10
River Plate, Ord.	Stock	9	10	218 — 228	..	4 7 9
Do. 6 % Non-Cum. Pref.	Do.	6	6	107 — 114	..	5 5 8
Do. 5 % Deb. Stock	Do.	5	5	101½ — 103½	..	4 16 7
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	99 — 101	..	4 9 1
Shawinigan Water, Capital	$100	4	4	118 — 120 xd	+2½	3 6 8
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	107 — 109	..	4 11 9
Do. 4½ % Per. Deb.	Stock	4½	4½	103½ — 105½	+ ½	4 5 4
Toronto Power, 4½ % Deb.	Do.	4½	4½	100 — 102	..	4 8 3
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	92 — 94	..	5 6 5
Victoria Falls Power, Pref.	1	Nil	Nil	1/16 — 1	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	..	6	106½ — 108½	+ ½	5 10 7

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	10	Nil	Nil	7⅛ — 7⅜	..	Nil.
Do. 5 % Deb. Red.	Stock	5	5	99 — 101	..	4 19 0
American Telep. & Teleg., Cap.	$100	8	8	138 — 140	+2	5 14 4
Do. Collat. Trust	$1000	4	4	93 — 95	..	4 4 3
Anglo-American Telegraph	Stock	8⅜	8⅜	67½ — 69½ xd	+1½	5 7 11
Do. 6 % Pref.	Do.	6	6	110½ — 111½ xd	+1⅛	5 7 5
Do. Def.	Do.	25/-	80/-	26⅛ — 26⅝	..	5 12 8
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	101 — 103	..	4 17 1
Chili Telephone	5	8	7	6⅛ — 7⅛	..	4 18 3
Commercial Cable, Stlg. 4% Deb.	Stock	4	4	86¼ — 88¼	..	4 10 5
Cuba Telegraph	10	6	6	10⅜ — 11	..	5 9 1
Do. 10 % Pref.	10	10	10	17⅞ — 18½	..	5 9 7
Direct Spanish Telegraph, Ord.	5	4	4	3⅞ — 4	..	5 0 0
Do. 10 % Cum. Pref.	5	10	10	8⅜ — 8⅞	..	5 14 8
Do. 4½ % Debs.	50	4½	4½	100 — 102	..	4 8 3
Direct United States Cable	10	4½	4½	7⅞ — 8½	..	5 9 1
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	99½ — 101½	..	4 8 8
Eastern Telegraph, Ord. Stock	Stock	7	7	136 — 139 xd	+ ½	5 0 9
Do. 8½ % Pref. Stock	Do.	8½	8½	83 — 85 xd	..	4 2 4
Do. 4 % Mort. Deb.	Do.	4	4	102½ — 104½	..	3 16 7
Eastern Extension	10	7	7	13⅜ — 14 xd	+ ⅛	5 0 0
Do. 4 % Deb.	Stock	4	4	100½ — 102½	..	3 18 1
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	100 — 102	..	3 18 5
Globe Telegraph and Trust	10	5⅞	5⅞	10½ — 11	..	5 6 10
Do. 6 % Pref.	10	6	6	12⅜ — 13⅜	..	4 9 9
Great Northern Telegraph	10	18	18	30½ — 31½	+ ½	5 14 3
Indo-European Telegraph	25	13	13	56½ — 58½	..	5 11 1
Mackay Companies Common	$100	4	5	85 — 88	+2½	5 13 8
Do. 4 % Cum. Pref.	$100	4	4	74 — 76	..	5 5 3
Marconi's Wireless Telegraph	1	Nil	Nil	2 7/16 — 2 9/16	+ 1/16	..
Monte Video Telephone, Ord.	1	6	6	¾ — 1	..	6 0 0
Do. 5 % Pref.	1	5	5	1/16 — 1/8	+ 1/16	5 6 8
National Telephone, Pref.	Stock	6	6	104 — 106	..	5 18 2
Do. Def.	Do.	6	6	118 — 121	..	4 19 2
Do. 6 % Cum. 1st Pref.	10	6	6	9⅞ — 10⅜	..	5 12 11
Do. 6 % Cum. 2nd Pref.	10	6	6	9¾ — 10¼	..	5 17 1
Do. 5 % Non-cum. 3rd Pref.	5	5	5	5⅜ — 5⅝	..	4 8 11
Do. 3½ % Deb.	Stock	3½	3½	96 — 101	..	3 9 4
Do. 4 % Deb.	Do	4	4	99 — 101	..	3 19 3
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	103 — 104	+ ½	4 6 7
Oriental Telep. and Elec.	1	8	8	13⅞ — 14½ xd	..	4 16 7
Do. 6 % Cum. Pref.	1	6	6	1 7/16 — 1 9/16 xd	+ 1/16	4 11 5
Do. 4 % Red. Deb.	Stock	4	4	88 — 90	..	4 8 11
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	99½ — 101½	..	3 18 10
Reuter's	3	5	5	9 — 9½	..	4 4 3
Submarine Cables Trust	Cert.	6	6	130 — 133 xd	..	4 10 3
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	99 — 101	..	4 9 1
United River Plate Telephone	5	8	8	7⅞ — 7 15/16	..	5 7 7
Do. 5 % Cum. Pref.	5	5	5	5⅛ — 5⅜	..	4 10 11
West Coast of America	2½	2½	2½	1⅝ — 1¾	..	6 5 0
Do. 4 % Debs., 1 to 1,500 guar. by Bras. Sub. Tel.	100	4	4	98 — 100	..	4 0 0
West India and Panama Teleg.	10	Nil	¾	2⅛ — 3	+ 1/16	2 10 0
Do. 6 % Cum. 1st Pref.	10	6	6	10⅛ — 10⅝	..	5 12 11
Do. 6 % Cum. 2nd Pref.	10	14½	6	9½ — 10¼	..	5 17 1
Do. 5 % Debs.	100	5	5	101 — 103	..	4 17 1
Western Telegraph, Ltd.	10	7	7	13¾ — 13¾	..	5 1 10
Do. 4 % Deb.	Stock	4	4	101 — 103	..	3 17 8
Western Union Tel., 4% Bnds. A	$1000	4	4	105½ — 108½ xd	+ ½	3 13 9
Do. 4½ % Fdg. Bonds	$1000	4½	4½	99 — 102 xd	..	4 8 3

* Unless otherwise stated, all shares are fully paid.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1909.	Dividends for 1910.	Closing Quotations Oct. 17th.	Rise + or Fall —	Present Yield p.c.
	*					£ s. d.
Bath Trams, Pref. Ord.	1	Nil	Nil	⅛ — ¼	..	Nil
Do. 5 % Pref.	1	5	5	⅞ — 1	..	6 18 4
Do. 4½ % Deb.	100	4½	4½	77 — 81	..	5 11 1
Brit. Elec. Trac., Ord.	10	Nil	Nil	1⅛ — 1⅜	— 1/16	Nil
Do. 6 % Pref.	10	3	1½	3⅝ — 4⅛	— ⅛	3 12 9
Do. 5 % Deb.	100	5	5	91 — 94	—1	5 6 5
Do. 4½ % 2nd Deb.	100	4½	4½	75 — 79	+1	5 13 11
Central London Railway, Ord.	100	3	3	65 — 67	..	4 9 7
Do. Pref.	100	4	4	84 — 86	..	4 13 0
Do. Def.	100	2	2	48 — 50	..	4 0 0
Do. 4 % Deb.	100	4	4	102 —104	..	3 16 11
City & South London, Ord.	100	1½	1½	30 — 31	+1½	4 16 9
Do. 5 % Pref., 1891	100	5	5	108 —110	..	4 11 0
Do. Do. 1896	100	5	5	104 —106	..	4 14 4
Do. Do. 1901	100	5	5	103 —105	..	4 15 3
Do. Do. 1903	100	5	5	102 —104	..	4 16 2
Do. 4 % Deb.	100	4	4	102 —104	..	3 16 7
Dublin United Trams, 6 % Pref.	10	6	6	11 — 12	..	5 0 0
Great Northern & City, Pr'f. Ord	10	Nil	Nil	⅞ — 1⅛	..	Nil
Hastings Trams, 6 % Pref.	5	Nil	Nil	⅜ — ⅝	..	Nil
Do. 4½ % Deb.	100	4½	4½	74 — 79	..	5 13 11
Isle of Thanet Trams, 5 % Pref.	5	1½	2½	2⅜ — 3	..	4 3 4
Do. 4 % Deb.	100	4	4	77 — 82	..	4 17 7
Lancashire United, 5 % Deb.	100	5	5	79 — 82	..	6 1 11
London Elec. Railw'ys, 4 % Deb.	100	4	4	96 — 98	..	4 1 8
London United Trams, 5 % Pref.	10	Nil	Nil	2⅜ — 3⅜	— ⅛	Nil
Do. 4 % Deb.	100	4	4	71 — 75	..	5 6 8
Metropolitan Railway Consol.	*	1909. 1	1910. 1⅛	42 — 42½	+ 1	£ s. d. 3 4 8
Do. Surplus Lands	100	2⅜	2⅜	64 — 66	..	4 8 4
Do. 3¾ % Deb.	100	3½	3½	88 — 90	..	3 17 9
Do. 3½ % Pref.	100	3½	3½	85 — 87	—1	4 0 6
Do. 3½ % Con. Pref.	100	3½	3½	84 — 86	..	4 1 5
Metropolitan District Ord.	100	Nil	Nil	25½ — 26	+½	Nil
Do. 6 % Deb.	100	6	6	144 —146	..	4 2 2
Do. 4 % Deb.	100	4	4	96 — 98	—1	4 1 8
Do. 4 % Prior Lien	100	4	4	100 —102	..	3 18 5
Do. 4½ % First Pref.	100	Nil	3½	85 — 87	..	3 14 9
Do. 3½ % Gtd.	100	3½	3½	73 — 75	..	4 13 4
Metropolitan Elec. Trams, Ord.	1	5	5½	5⅜ — 5 11/32xd	..	5 12 4
Do. Def.	1	Nil	Nil	3/32 — 5/32	— 1/16	Nil
Do. 5 % Pref.	1	5	5	⅞ — 1	..	5 0 0
Do. 4½ % Deb.	100	4½	4½	100—102	..	4 8 3
Do. 5 % Deb.	100	5	5	100—102	..	4 18 0
Potteries, Ord.	1	2	2	7/32 — 9/32	..	..
Do. 5 % Pref.	1	5	5	13/32 — 15/32	..	7 12 4
Do. 4½ % Deb.	100	4½	4½	88 — 91	..	5 18 11
South Metro. Trams, 6 % Pref.	1	3	6	⅜ — ⅞	..	6 17 2
Do. 4 % Deb.	100	4	4	72 — 77	..	5 3 11
Underground Elec. Railways	10	..	..	1⅜ — 1⅝	..	..
Do. 4½ % Bonds	100	4½	4½	99 —101	—1	4 9 1
Do. 6 % Income	100	Nil	1	57 — 59	..	1 13 11
Do. Power House Debs.	100	..	4	100 —102 xd	..	3 18 5
Yorkshire (West Riding), Ord.	5	Nil	Nil	⅛ — ¼	..	Nil
Do. 6 % Pref.	5	Nil	Nil	2⅜ — 2¾	..	Nil
Do. 4½ % Deb.	100	4½	4½	80 — 85	..	5 5 11

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5	5	4 13/16 — 5 1/16	— 1/16	4 16 5
Do. 2nd Pref.	5	5	5	4⅞ — 4 15/16	— 1/16	5 2 7
Do. 4 % Deb.	100	4	4	93½ — 95½	..	4 8 9
Do. 4½ % Deb.	100	4½	4½	102 —104	+ 1	4 6 7
Do. 5 % Deb.	100	5	5	100 —102	— 1	4 18 0
Auckland Trams, 5 % Deb.	100	5	5	102 —105	..	4 16 2
Bombay Elec. S. & Trams, Pref.	10	6	6	10¾ — 11¼	..	5 6 8
Do. 4½ % Deb.	100	4½	4½	97 — 99	..	4 10 11
Do. 5 % 2nd Deb.	100	5	5	97 — 99	..	5 1 0
Brisbane Trams Invt., Ord.	5	8	8	6⅞ — 7⅛	..	5 12 3
Do. 5 % Pref.	5	5	5	5 — 5⅛	..	4 13 0
Do. 4½ % Deb.	100	4½	4½	102 —105	..	4 5 9
B. Columbia Elec. Rly., Def.	100	8	8	141 —145	..	5 10 4
Do. Pref. Ord.	100	6	6	121 —125	..	4 16 0
Do. 5 % Pref.	100	5	5	108¾ — 111½	+ ¾	4 9 8
Do. 4½ % 1st Mort. Deb.	40	4½	4½	98 —101 xd	+ ½	4 9 1
Do. 4½ % Vancouver Deb.	100	4½	4½	101 —104	..	4 6 7
Do. 4½ % Con. Deb.	100	4½	4½	101½ — 103½	..	4 5 4
Calcutta Trams, Ord.	5	4½	6	5 5/16 — 6 7/16 xd	..	4 16 0
Do. 5 % Pref.	5	5	5	5 — 5¼	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	102 —105	..	4 5 9
Cape Electric Trams	1	Nil	Nil	7/16 — 9/16	..	Nil
City Buenos Aires Trams (1904)	5	5	5	5 3/16 — 5 5/16	..	4 12 6
Do. 4 % Deb.	100	5	5	97 —100	+1	5 0 0
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	95 —100	..	5 0 0
Havana Elec. Rly., 5 % Bonds	$1000	5	5	101½ —104½	+1	4 15 8
Kalgoorlie Elec. Trams	1	Nil	Nil	3/16 — 5/16	..	Nil
Do. 5 % A Deb.	100	5	5	92½ — 95½	..	5 4 9
Do. 6 % B Deb.	100	6	5	62 — 66	..	7 11 6
La Plata Elec. Trms, Prf.	1	6	6	⅜ — 1	..	6 0 0
Lisbon Elec. Trams, Ord.	1	5½	5½	1 — 1⅛	..	4 8 0
Do. 6 % Pref.	1	6	6	1 — 1⅛	..	4 16 0
Do. 5 % Deb.	100	5	5	96 —100	..	5 0 0
Madras Elec. Tr. (1904), Deb.	100	5	5	95 — 98	..	5 2 0
Manaos Trams & Lt., 1st Deb.	100	..	5	90 — 92	..	5 8 8
Manila Elec. R. and Ltg., Bonds	$1000	5	5	98 —100	..	5 0 0
Mexico Trams Com.	$100	7	7	117 —119 xd	+1½	5 17 8
Do. Gen. Con. 5 % Bonds	..	5	5	98½ — 100½	+ ½	4 19 6
Do. 6 % Bonds	100	6	6	99 —101	+1	5 18 10
Para Elec. Rlys. & Lt., Ord.	5	..	10	7 1/16 — 7 7/16	+ 5/16	6 14 5
Do. 6 % Pref.	5	6	6	5⅞ — 6⅛	..	5 4 4
Do. 5 % 1st Deb.	100	5	5	99½ — 101½	..	4 18 6
Perth (W.A.) Elec. Tr., Ord.	1	2½	2½	1 3/16 — 1 5/16	..	3 7 1
Do. 5 % 1st. Deb.	100	5	5	101½ — 103½	..	4 16 7
Rangoon El. Tr. & Sup., Pref.	5	6	6	5⅜ — 5⅝	..	5 6 8
Do. 4½ % 1st Deb.	100	4½	4½	98 —101	..	4 9 1
Rio de Janeiro Trams	$100	1	4½	117 —118 xd	+1	3 16 3
Do. 1st Mort. 5 % Bonds	..	5	5	101⅜ — 102⅜	+ ⅛	4 17 4
Do. 5 % Mort. Bonds	100	5	5	95½ — 96½	..	5 8 8
Sao Paulo Tram, Lt. and P.	$100	10	10	180 —185	+3½	5 8 1
Do. 5 % 1st Deb.	$500	5	5	105 —107	+1½	4 13 6
Singapore Trams, 5 % Deb.	100	5	5	82 — 85 xd	..	5 17 8
Southern El. Tr. B.A., 5 % Deb.	100	5	5	96½ — 97½	..	5 2 7
Un. Elec. Trams Monte Video	5	5	6	5½ — 6	..	5 0 0
Do. 6 % Pref.	5	6	6	5 — 5½	..	5 9 1
Do. 5 % 1st Deb.	100	5	5	102 —105	..	4 15 8
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	105½ — 107½	..	4 3 9

MANUFACTURING COMPANIES.

Aron, Ord.	1	..	Nil	9/16 — 11/16	..	Nil
Do. 6 % Pref.	1	12	9	15/16 — 1 1/16	..	7 7 8
Babcock & Wilcox	1	24	26	5 13/16 — 5 15/16	— 1/16	4 11 5
Do. Pref.	1	6	6	1 5/16 — 1 7/16	..	4 0 0
B.I. & Helsby Cables	5	10	10	6¾ — 7⅛	..	6 17 11
Do. Pref.	5	6	6	5⅞ — 6⅛	..	4 16 0
Do. Deb.	100	4½	4½	102 —104	..	4 6 7
British Thomson-Houston, Deb.	100	4½	4½	94 — 97	..	4 12 9
British Westinghouse, Pref.	3	Nil	Nil	⅛ — ⅜	..	Nil
Do. Deb.	100	4	4	58 — 61	..	6 11 2
Do. 6 % Prior Lien	100	6	6	99 —101	..	5 18 10
Browett, Lindley, Ord.	1	Nil	Nil	1/6—2/-	..	Nil
Do. Pref.	1	Nil	Nil	5/- —6/-	..	Nil
Brush, Ord.	2	Nil	Nil	1/16 — 3/16	..	Nil
Do. 7 % Pref.	2	Nil	Nil	⅛ — ⅜	..	Nil
Do. 4½ % Deb.	100	4½	4½	56 — 61	..	7 7 7
Do. 4½ % Second Deb.	100	4½	4½	39 — 44	..	10 4 6
Callender's Cable	5	15	15	9 — 9¼	..	7 13 10
Do. Pref.	5	5	5	4 15/16 — 5 1/16	..	4 16 5
Do. Deb	100	4½	4½	101 —103	..	4 7 5
Castner-Kellner	1	14	17½	8¾ — 8⅞	..	4 16 7
Do. Deb.	100	4½	4½	104 —108	..	4 3 4
Crompton & Co.	3	Nil	Nil	⅛ — ⅜	..	Nil
Do. Deb.	100	5	5	55 — 65	..	7 13 10
Dick, Kerr	1	6	5	3/16 — 7/32 xd	..	5 14 3
Do. Pref.	1	6	6	1 3/16 — 1 5/16 xd	+ 1/32	5 12 11
Do. Deb.	100	4½	4½	95 — 98	..	4 11 10
Edison & Swan, A, £3 paid	5	Nil	Nil	3/16 — 5/16	..	Nil
Do. fully paid	5	Nil	Nil	1⅛ — 2⅛	..	Nil
Do. 4 % Deb.	100	4	4	67 — 71	..	5 12 8
Do. 5 % Second Deb.	100	5	5	77 — 80	..	6 5 0
Electric Construction	2	Nil	Nil	⅛ — ⅜	..	6 13 4
Do. Pref.	2	7	7	1½ — 1¾	..	7 4 4
Greenwood & Batley, Pref.	10	7	7	7½ — 8½	..	8 5 8
Do. Deb.	100	5	5	94 — 96	..	5 4 2
General Electric, Pref.	10	5	5	8¾ — 9½	..	5 8 1
Do. Deb.	100	4	4	86 — 91	..	4 7 11
Henley's, Ord.	5	15	15	13 — 13⅜	..	5 17 8
Do. Pref.	5	4½	4½	4 13/16 — 5 1/16	..	4 5 11
Do. Deb.	100	4½	4½	100¾ — 102¾	..	4 2 11
India-Rubber, G. & T.	10	10	10	13⅜ — 15½	..	6 9 0
Do. Pref.	10	5	5	9⅞ — 10⅜	..	4 16 5
Telegraph Construction	12	17½	20	34½ — 36½	..	6 11 7
Do. Deb.	100	4	4	100 —102	..	3 18 5
Willans & Robinson	1	Nil	Nil	3/32 — 5/32	..	Nil
Do. Pref.	5	1½	Nil	¼ — ⅜	..	Nil
Do. Deb.	100	4	4	55 — 65	..	6 3 1

* Unless otherwise stated, all shares are fully paid.

Bank rate of Discount 4 per cent., September 21st, 1911.

THE ELECTRICAL APPARATUS CO.'S NEW WORKS.

It seems but a short time since we visited the works of this young but thriving company in Battersea, when it had fairly established itself in the manufacture of meters, motor-starters and fuses. So rapidly, however, has the company's business developed that it has been found imperatively necessary to obtain increased accommodation in order to cope with the orders in hand and in prospect. At first this was accomplished by making extensions at the Milford Works, but about a year ago the directors realised that the limit had been reached, and that the works must be removed to a more suitable site.

Starter Assembly Benches.

As a rule, it is found advisable, at this stage, to remove a business from the area controlled by the London County Council altogether, in order to escape the oppressive conditions imposed upon manufacturers within that area, as well as the heavy rates and taxes, and to facilitate access to the works on the part of the employés, at the same time reducing the cost of land and labour. The nature and conditions of the company's business, however, were such as to render this course undesirable, and the directors decided that it would be advantageous to remain in London, in spite of the drawbacks above mentioned. They, therefore, decided to purchase a large freehold site at Vauxhall, on part of which they have erected the "Vauxhall Works," in South Lambeth Road.

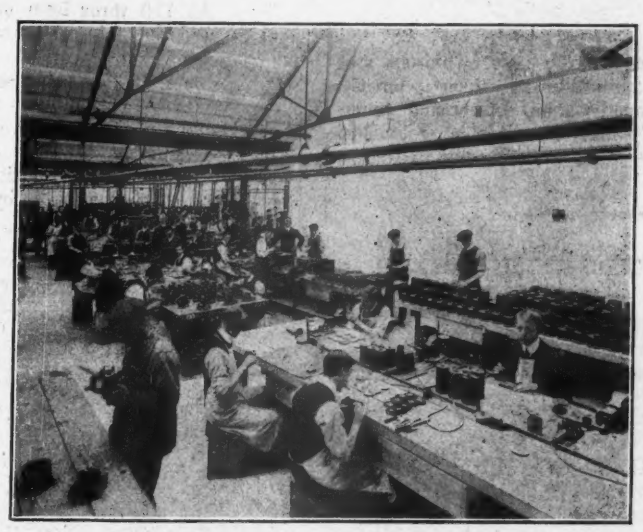
The buildings are of modern design, all on one floor, well lighted from the roof and adequately ventilated; at present they provide accommodation for 250 men, and the remainder of the site will afford space for almost as many more when extensions are required.

The company has taken the opportunity to install the best modern machinery for the manufacture of its apparatus, and has found it profitable to make for itself even such standard parts as nuts and screws. A gear-cutting machine has also been installed for cutting the teeth of all kinds of small toothed wheels, especially those used in the manufacture of meters.

We give herewith some views of the interior of the works, showing the general construction of the buildings, the excellent system of roof lighting, and some of the equipment. The chief lines of manufacture are the E.A.C. high-torque meter, which is widely known and used both in this country and in the Colonies; the E.A.C. motor control gear; the Koolark patent enclosed fuses; and, of more recent adoption, totally enclosed switches and switch fuses; A.C. motor control gear of various types, and drum controllers.

A well-equipped testing department and laboratory is provided, where finished parts are inspected and tested before they are issued for assembly. Meter gears are run through their whole range by a gentle breeze from electric fans, so that no faulty gear can escape detection, and magnets, armatures, &c., are required to pass a number of tests to ensure their freedom from any defect. Completed meters are tested and calibrated, and must be accurate within the limits allowed by the Board of Trade; no meter which fails to run well on its starting current during a whole night is passed for dispatch.

Switchgear, fuses and starters similarly undergo tests under working conditions, and it is almost impossible for faulty apparatus to escape detection.



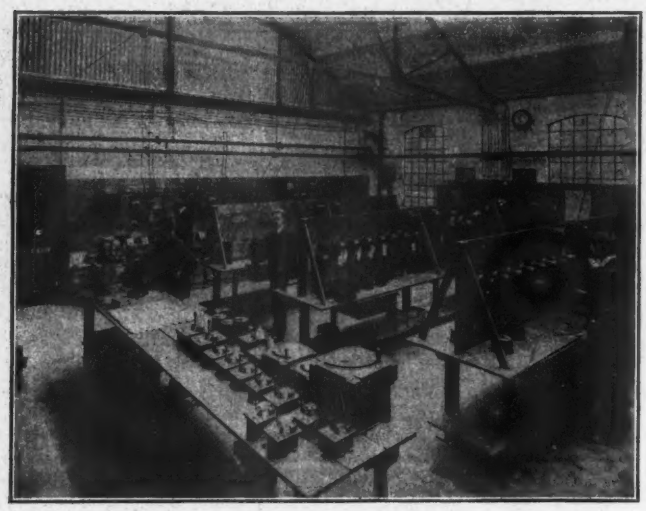
Meter Assembly Benches.

The E.A.C. meter, which is of the motor type, with the three-coil armature winding enclosed between the aluminium braking disks, is insulated throughout with mica, with the sole exception of the commutator segments, which are mounted on an ebonite sleeve. It is guaranteed accurate for three years. A prepayment meter, consisting of the standard meter, combined with a patent penny-in-the-slot attachment, has recently been introduced.

The company's standard starters and regulators have been

Machine Shop.

described in our "New Electrical Devices," and are constantly increasing in number and variety. We illustrate one of these as an example of the work turned out—the E.A.C. patent D.C. automatic starter, which is actuated by means of a solenoid main switch: larger starters of this kind, with separate solenoid switches mounted on panels, are also made. Cinematograph resistances, A.C. starters, induction regulators,



Test Room.

&c., come within the scope of the company's operations, and it is satisfactory to note that in a business which is already subject to such severe competition, an enterprising young firm like this can not only make a reasonable profit, but has also been able to place a considerable sum to reserve each year.

ELECTRICAL ACCIDENTS IN MINES.

(*Concluded from page* 631.)

In No. 4 (Yorkshire) District there were five cases of death from electric shock, one being on the surface. Of these Mr. Pickering says:—

"Two of the cases may be described in detail, as they are typical of accidents from electric shock, and emphasise the importance of *skilled supervision of electrical work and of effective earthing*. (The italics are ours.)

"At 10 p.m. on April 20th, at South Wingfield Colliery, a miner and his brother took charge of a Diamond coal-cutting machine which had been at work during the previous shift, and started the machine without making an inspection of cables or connections, as required by Special Rule No. 30. At 5.30 a.m. a distance of 70 yd. had been cut, and deceased was in front of the machine and in contact with the haulage rope by which the machine is pulled along. He received a shock and was killed. His brother went along the face a distance of 70 yd. to the gate-end box, switched off the current, and then went 400 yd. to the shaft for assistance. Thus, much time was lost before artificial respiration could be tried.

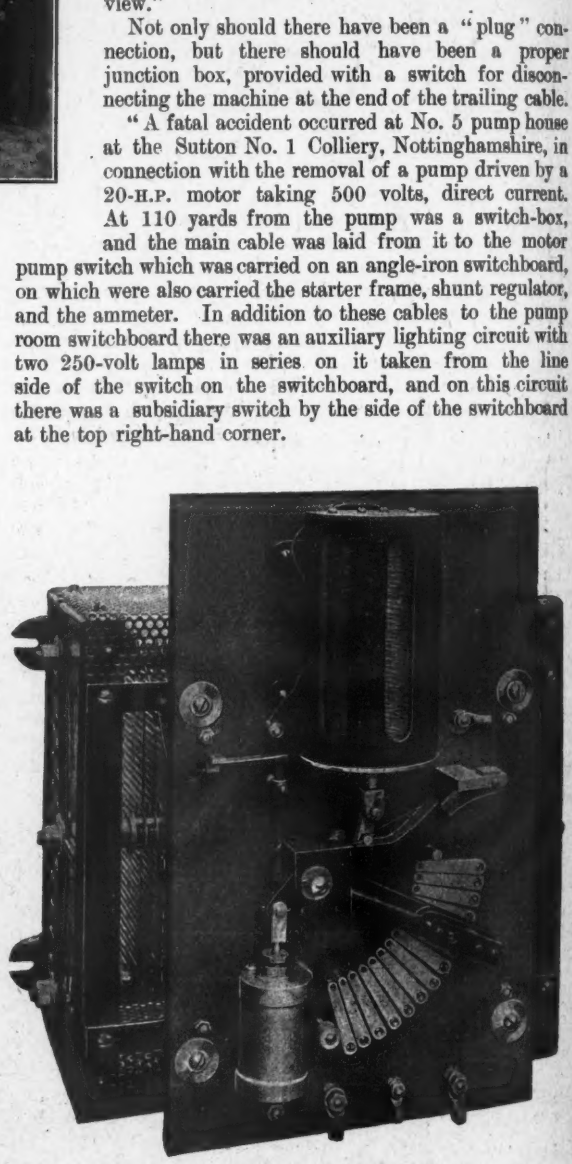
"The circumstances of the accident suggested electric shock from the haulage rope, and a defect was ultimately found to account for the 'live' haulage rope, as the earthed negative cable was fractured.

"The system of distribution was direct current 500 volts by means of concentric cables, the outer conductor being connected to earth at the surface and at the shaft bottom. The trailing cable was a two-core leather and rope-protected cable. One of the cores was connected to the 'live' inner wire and to the positive terminal of the coal-cutter, the other to the earthed outer wire and to the negative terminal of the coal-cutter. This negative terminal of the coal-cutter was again connected to the machine frame, so that the only way the frame of the machine could become alive was by fracture of the earthed negative cable. That is what took place, and the whole machine and haulage rope became charged with the full voltage of the positive line through the armature windings and the cable connecting the negative terminal with the machine frame. The cause of the fracture was the frequent movement of the cable at the place where the two cores of the trailing cable are brought together. As the break was gradually being made under insulation that remained intact, it is difficult to award actual blame, *but a careful examination* by passing the hand along the insulation might have revealed some broken wires.

"As the safety of the workmen at this coal-cutter depended entirely on the continuity of the connection to the outer conductor, the safest form of connection would be a "plug" connection similar to that at the machine end. This accident chiefly emphasises the importance of maintaining the outer conductor in a concentric system of distribution absolutely continuous. So long as this is done the concentric system may be regarded as perhaps the safest system from a shock point of view."

Not only should there have been a "plug" connection, but there should have been a proper junction box, provided with a switch for disconnecting the machine at the end of the trailing cable.

"A fatal accident occurred at No. 5 pump house at the Sutton No. 1 Colliery, Nottinghamshire, in connection with the removal of a pump driven by a 20-H.P. motor taking 500 volts, direct current. At 110 yards from the pump was a switch-box, and the main cable was laid from it to the motor pump switch which was carried on an angle-iron switchboard, on which were also carried the starter frame, shunt regulator, and the ammeter. In addition to these cables to the pump room switchboard there was an auxiliary lighting circuit with two 250-volt lamps in series on it taken from the line side of the switch on the switchboard, and on this circuit there was a subsidiary switch by the side of the switchboard at the top right-hand corner.



E.A.C. Patent D.C. Automatic Starter.

"The pump was not much above its work, and therefore it was necessary to pump the water down as low as possible, and then remove the pump, motor, switchboard, gear, &c., rapidly to prevent their being drowned. The water had been pumped down and the connection from the switch to the motor and starter disconnected, but the lighting circuit was left on and the lamps were burning.

"The electrician gave instructions to two men to remove the pump and motor, and "to make everything safe," but he does not appear to have given any specific orders as to details. The two men were working with the auxiliary lighting circuit on, and when detaching the frame of the starter from the switchboard they both received a shock. One man was unconscious, but soon recovered, and walked 500 yards to the shaft. The other man died instantly.

"The accident appears to have been due to a fault on the lighting circuit which caused the frame of the starter to be alive, and as soon as the contact between the switchboard and the frame of the starter was slightly broken, the two men received a shock. The floor of the house was wet and the girders on which it was formed were in water. The switchboard frame was earthed by means of a single galvanised wire to the girders on which the pump and motor were placed, and through them to the suction and rising main pipes.

"It was highly dangerous to have a lighting circuit connected to a board from which the apparatus was being removed. The whole of the current should have been switched off at the box 110 yards away, so that everything in the pump house would be dead. If this had been done the accident could not possibly have occurred. *After the fatality the whole of the plant was overhauled and put into good order.*" (Again the italics are ours.)

It may be remembered that in his last report Mr. Pickering condemned electricity in mines wholesale, and one cannot wonder at his attitude if this sort of thing is "typical" of the way in which electricity is installed and worked in the mines in his district.

There was only one fatal accident underground in No. 5 (Manchester) District and one on the surface. In the first a self-acting incline attendant termed a "jigger" was killed. "The self-acting incline is 200 yd. long, rising 1 in 3, and electric cables conduct continuous current at 525 volts up this incline to work coal-cutting machines in the seam at the top. Galvanised wire signal cord, which signals by pulling, passes along the left-hand side of the incline; for 70 yd. from the bottom an electric cable passes along the same side, then crosses the brow, and is from that point carried to the top on the side opposite to the signal wire to the gate-end switchbox. The electric cable had around the copper conductor india-rubber insulation; this was protected by jute braiding, and around this was steel wire armouring, and outside all, simple braiding. About 9.30 a.m. a full tub ran amain from the top, and two or three men went down to put this right; the tub was an iron one. Deceased went about 40 yd. down the brow, leaving a man at the brake of the jig wheel: while deceased was in the brow, communications passed from the men putting the runaway on the rails with a view to the rope being moved, and deceased signalled by pulling the signal cord. Shortly after, the repairing men passed up the brow and found Merrick lying on his back dead. These men testified to receiving shocks when dealing with the tub, from the tub, the haulage rope, and from the signal cord. When the electrician tested the cable, he found at the gate-end switchbox a leakage, the insulation of the conductor had been broken from chafing on the edge of the box, there being no bush; this caused the whole of the armouring of the cable to be alive. Mr. Nelson, H.M. Inspector of Electricity in Mines, found on examination that the earthing of the armouring of the cables was not effective. Instead of proper clamps, thin wire loosely wrapped around the cable was depended upon. The final earthing was underground in a water lodge, and was not satisfactory. The coal-cutter only worked in the night time; at 5.50 a.m. the coal-cutter men said they switched off the electric current in the level, on the out-bye side of the jig brow, which, had it been done or had it continued so, would have made the cable in the brow dead.

"Either the coal-cutter men did not switch off the current (a witness said he saw it done), or some meddling person switched on the current. All the boys in the vicinity denied having touched the switch."

This accident again raises the question of wire armouring and the difficulty of getting and maintaining an efficient "earth." Had the cables been unarmoured and laid in strong wood boxes the accident would have been absolutely impossible.

Two non-fatal accidents on the surface are reported, in one of which an electrical apprentice, whilst assisting to renew the wiring for an electric lamp, came into contact with a live wire, with the result that the palm of the left hand was burned and he received a slight shock. A misunderstanding caused the current to be taken off the wrong wire; the person in charge, instead of doing this himself, sent a message. The pressure, 500 volts, is now being reduced by the installation of transformers.

In the other case a surface labourer received a severe electric shock, and was rendered unconscious for several minutes. He was restored by Sylvester's method, his right hand being burned. Machinery from an old engine house was being removed, and to get the fly-wheel out a derrick pole was put up. In the absence of the foreman a labourer threw a 5/16-in. galvanised wire rope over five overhead electric cables, bare wires; the wire rope caught on one, and probably on other electric cables, causing a short to earth by the wire rope. Morton took hold of the wire rope, receiving the shock. Two of the cables carried current at 120 volts, three at 400 volts.

Such an accident as the former may never be completely eradicated until colliery electricians are properly trained and made responsible for carrying out their duties. It is interesting to note that the pressure is being reduced from 500 volts for lighting purposes, a very sensible and proper thing to do. As regards the second, this may be put down as a pure accident, as, no doubt, the labourer, in throwing the rope, would think he could clear the cables, assuming that he was aware of what would happen if he did not, which is doubtful.

There were no fatal accidents in No. 6 (Manchester) District, and only four non-fatal accidents are reported, two on the surface and two underground. Of the surface accidents, one was due to a fitter touching a live part in a power station; of the other case, particulars are given below. In the two underground accidents, slight injury in both cases was due to a glove not being put on whilst a fuse was being inserted. There ought, however, to be no necessity for gloves to be worn during the insertion of a new fuse, as fuse boxes should be so made that they cannot be opened unless the current is first cut off. The second surface accident was caused through a contravention of No. 10 of the rules governing the use of electricity. The injured man was the attendant, and had been so employed six months in charge of the power station where the current, three-phase, at 2,200 volts, is generated for use underground, being there transformed to 450.

"The parts at the back of the switchboard in the power station were enclosed by a locked cage 7 ft. 8 in. high × 2 ft. 10 in. × 2 ft. 7 in. The attendant had unlocked and opened the door, and through touching a live part, got seriously injured. He said he did not remember what happened, but as a piece of waste was found on the floor, it was concluded that he was dusting the apparatus without first switching off the current. Since this accident, the cage has been fitted with a device which ensures that the door cannot be opened before the current has been switched off."

Under the head of "dangerous occurrences," an underground fire caused by electricity is reported. This was investigated by Mr. Nelson, H.M. Electrical Inspector, who reported as follows:—

"Current is generated as three-phase current at 500 volts, 40 cycles. The shaft cables are protected from mechanical damage by steel-wire armour, but the in-bye cables are unarmoured and of various kinds: the older cables being insulated with rubber and the newer with vulcanised bitumen.

"The fire occurred at the junction of two roads running at right angles in the Orrell seam; one a main haulage road in which the electric cables were suspended, the other a branch road rising from the main road, and along which there is an auxiliary haulage. A runaway set of tubs coming down the auxiliary road carried away the cables at the junction, and in so doing drew out three ends of cables from a joint box supported on a wooden frame in the main road, and fixed just at the junction of the two roads. The resultant arcing fired the cable insulation, but the fire was soon extinguished. Such an accident can clearly only be avoided if it is forbidden to carry unprotected cables in haulage ways. Even if the circuit-opening device is efficient and acts promptly (as it appears to have done in this case) with similar cables to those in use, similarly supported, there is evidently still

the possibility of fire. The place could not, I think, be described as 'dusty'—in a dry and dusty pit a similar occurrence might clearly have provided a very serious accident.

"It can only be said that efficient mechanical protection for underground cables in haulage ways is really very important. I understand that steps will be taken to so place the cable that a similar occurrence at that spot will hardly be possible in the future; but the only way in which to avoid accidents of this kind would be to provide strong armouring for underground cables in haulage ways. It may be pointed out that in this case the fault occurred at a junction box, and in this connection, whether the cable system be armoured or unarmoured, junction boxes form the weakest link in the chain. But if the cables be armoured the armouring can be strongly secured to the box, and in this way an armoured system can be made much stronger than an unarmoured system at junction boxes elsewhere."

Mr. Nelson has great faith in wire armouring, but in such an accident as this it cannot be said that it is absolutely safe, and cables laid in strong wood boxes would undoubtedly be safer against falls of roof and sides, or iron girders or runaway tubs.

In No. 7 District (South Wales) the Inspector says (the italics are ours, and need no further comment), "that there were three fatal and four non-fatal accidents by electricity underground. Two of the fatal accidents were by electric cables, and one by a switch. Three of the non-fatal accidents were by cables, and one by changing a fuse with the current on. There is room for *great improvement in many of the smaller mines in the supervision and maintenance of the electric plants.*"

On the surface there were one fatal and four non-fatal accidents. The fatal one was caused by an overhead cable. One of the non-fatal accidents was caused by the brush of a motor, one by a transformer, one through the bursting of an incandescent lamp used for testing phases, by which two persons were injured, and one by contact with live metal at the back of a switchboard.

In No. 8 (Midland and Southern) District, one fatal and four non-fatal accidents were reported to the Inspector. The accident occurred to a mechanic's assistant who received an electric shock which resulted in his death. Three cables, conveying three-phase current to an 80-H.P. motor situated near the shaft bottom, had been fixed temporarily in the shaft near the end of one of the cage spaces, and were being removed to their permanent position by the side of the same cage space. The pressure was 550 volts, and each cable carried 74 amperes. They were insulated with rubber and jute, sunk in grooves in a $7\frac{1}{4} \times 1\frac{1}{2}$ in. deal, and covered with a $\frac{3}{4}$-in. deal nailed on at the edges. Deceased and two other men were engaged in stripping off the covering deal, preparatory to shifting the cables, the deceased being in charge of the shift. He had been instructed to have the current switched off while they were at work in the shaft, but to utilise every opportunity while they were up for snap or for other purpose to let the pump men get the water out. In addition to this a notice was posted at the pit bank, which stated: "When men are working in the shaft the electric motor must be switched off." When the men came up for snapping at 11 p.m. the current was switched on, but on descending the shaft again some 20 minutes later they, unfortunately, neglected to have it switched off. Deceased was driving a steel chisel into the joint of the covering board close to a nail, to make an opening for the insertion of a wooden wedge which was to be driven in to spring off the covering board. He held the chisel in one hand while driving it. It pierced the insulation, and he received a shock which caused him to fall from the cage to shaft bottom, a distance of about 253 yards. The men on the cage should have known that the cable was alive, as from the point where they were at work the noise caused by the pump could be very distinctly heard. The accident emphasises the danger of permitting such operations to be carried on without skilled supervision.

Particulars are not given of the other accidents, but enough has been gathered from a review of those reported to show that it is not electricity that is at fault; every accident is due either to want of skilled supervision or to the disgraceful way in which the plant is installed and worked. In view of all that has been said against the use of electricity in mines principally by persons who know nothing whatever about the matter, such methods cannot be too strongly condemned, and it would certainly be to the benefit of workmen, owners and managers of mines if more electrical inspectors could be appointed to see that the electricity rules are strictly carried out.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Trade Discounts to Private Consumers.

With reference to Mr. A. F. Lord's letter on the above subject in your last issue, it does not appear to me that a contractor, who cuts the price of his jobs so fine that he has to rely on the discount he may obtain from the manufacturers of the fittings to make his profit, is any authority on the subject. And then he says he sometimes has to divide this discount or profit with ironmongers and builders! This is not my idea of a good "business man."

I quite agree with the last paragraph of "Another Manufacturer's" letter, that X. & Co. acted very generously in offering Messrs. Coates & Co. 10 per cent., and that Messrs. Coates & Co. thoroughly deserved the snub they received.

C. G. Fox.

London, N., *October 17th*, 1911.

I have read with interest the two letters which appear in your issue dated October 13th, also the letter from Messrs. Coates & Co. in your previous issue which caused the same to be written.

I quite agree with the remarks of "Another Manufacturer," but with regard to Mr. A. F. Lord's letter, it appears to me that he has only got himself to blame if he quotes for jobs at under cost price, in the hope of making a profit out of a discount which may or may not be allowed to him by a manufacturer of fittings.

So far as a fittings manufactuer is concerned, I think he ought to adopt one of two courses. One is to refuse to supply the private customer direct and to insist upon the order coming through a contractor. The other is to charge the full list price to the private customer and pocket the extra profit himself, only giving a discount to trade customers. To my mind the matter is quite simple; it is purely a matter for the manufacturer to decide as to which way he prefers to do business—that is, which way suits his pocket best. After all, we all look after our own interests, no matter what the line of business is.

I can quite understand that Mr. A. F. Lord would consider himself lucky if he made 10 per cent. profit on his turnover; he is hardly likely to do this if he carries out wiring jobs at a loss, depending upon fittings manufacturers for a profit. As a total abstainer of 40 years' standing, I am glad that his whisky merchant did not offer him a discount on the commodity he deals in.

P. A. Reed.

London, N.W., *October 17th*, 1911.

The Evolution of Wiring Systems.

The communication made by your correspondent, "An Electrician," will undoubtedly prove very encouraging to many central station engineers, although I consider that the wisdom of publishing "rock bottom" prices, even in a trade journal, is somewhat doubtful.

My estimates of the prices of different kinds of wiring were based upon experience of the working of moderate-sized contracting businesses, and the lamp was taken as costing 2s. 9d.

Your correspondent may rest assured that an enormous amount of work is being done in moderate-sized private houses at the prices mentioned, and that those who carry out

this work do not appear to be getting rich very rapidly; this, of course, may be their own fault, but it does not alter the fact that the central station engineer in many places has to compete with gas through the medium of these contractors and prices of this order.

The chief object of the list of prices given was to draw attention to the relative costs of the different systems; where slip-conduit work can be properly carried out for 20 per cent. less than the figure shown, presumably the other systems will drop in almost the same proportion.

In spite of the fact that enamelled wire has been obtainable for years and that surface wiring has been carried out in many places, even in this country, these systems are still rarely met with and cannot hope to become general until the smaller contractor, who most needs cheap methods, can be induced to actually put them up and enable his men to become acquainted with them. Nearly all these systems prove at first to be as expensive as simple conduit work, and, generally speaking, they are abandoned as not being worth while, whereas with a little pains the men would become accustomed to them, and their full economy would stand revealed.

The cases mentioned where lights were installed very cheaply in factories bear little or no relation to ordinary house work with one or two lights and one switch to each room, and where all the plaster work has been completed and floors are laid, this being the condition under which a great amount of wiring has now to be carried out.

The cab tire and heavily covered flexibles have not so far been used extensively for ordinary house work, and the writer's object in mentioning them was merely to state a case for their employment, more particularly for heating circuits, where it is found so frequently that the cost of extra wiring is the greatest deterrent to the introduction of radiators in houses.

Possibly the most promising of all cheap systems of wiring is that in which enamelled or other lightly insulated wire is run on porcelain cleats, and your correspondent is undoubtedly right in saying that objections on the score of appearance may be easily overcome; unfortunately, the special fittings required to carry out this work satisfactorily have not up to the present been well advertised or brought to the notice of the average wiring contractor. It would be advantageous if some firm interested in the sale of these fittings could make a display of wiring carried out by means of them.

J. W. B.

With reference to the letter in your October 13th issue, on pages 597 and 598, dealing with the above, we should just like to point out that the style of the firm mentioned is incorrect. This should be D. H. Bonnella & Son, Ltd.

This is rather awkward, as we have no connection with the firm mentioned. We trust, therefore, you will be good enough to correct the error in your next issue.

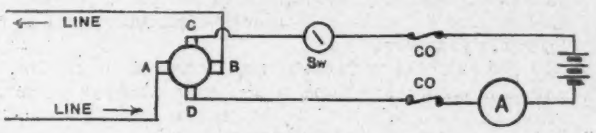
D. H. Bonnella & Son, Ltd.

London, W., *October* 16*th*, 1911.

Charging Ignition Cells.

I have noticed lately a discussion in your paper *re* the charging of small accumulators, and think, perhaps, you would like to have just another way of carrying out the above without serious losses. The method I am about to describe is one that occurred to me some time ago; it can be applied to any D.C. generator or motor provided the load is fairly constant. Take a simple illustration, a two-pole machine with brushes A and B in the usual position, and take a second pair of brushes on a separate rocker, their position being at right angles to the brushes (but not connected to them); on running the machine no current will pass C and D if circuit is closed.

Now, if E and D are rocked forward from the neutral position, the voltage will be proportional to the number of commutator bars cut into cell circuit; by this means any number of cells, say, within 20 per cent. of line voltage, may be charged, but of course this depends upon the type of armature used. The result to a motor is to slightly increase the speed and, of course, if the brushes are rocked too far, serious sparking will result; but for, say, 8 or 10 volts on a 220-volt circuit with an amperage of 1 to 5, any well-designed dynamo or motor should not give trouble from bad commutation. I have carried out tests under these conditions. The machine voltage was 230, the C and D circuit being 45 to 60 volts, and supplying X-ray coils giving 12-in. sparks; the machine used was an old 8-H.P. Crompton two-pole motor. The



Sw., Switch; CO, Cut-out.

amperes taken from the machine varied between 3 and 15. You will thus see that the action is practically that of an ordinary armature, used as a direct-current balanced auto-transformer.

Another method that works well with large generators, and can be used on almost any machine, is a brush placed in a separate holder in advance of the negative line brushes, the number of sections being determined by experiment; this owing to the small current taken does not interfere with the machine commutation.

I found by experiment that the C and D brushes should not cover more than two sections, and if the sections are wide, one section's width is still better.

J. R. Smith.

Dartford, *October* 14*th*, 1911.

Corrosion of Bell-pushes.

I should be glad if any contractor or electrochemist could give me a satisfactory explanation of the following:—

In a house which has been built about 15 months, I have found that in every bell-push on the upper floors, one of the terminals is corroded to a black colour, a slight crystalline deposit of a white colour appearing on the edges. The corrosion is sufficient to prevent current passing, but the second terminal in each case is still perfectly bright and clean. It would interest me to know whether this is due to electrolytic action, such as causes dust to accumulate on the positive side of switchboards, &c., or whether it is caused by damp (there is no external evidence of this in the house). The wires are laid in the usual way in zinc tubes buried under the plaster on the walls. The bells have not been used very much.

E. A. P.

October 11*th*, 1911.

Olympia Electrical Exhibition.

Our attention has been called to a letter in your issue of the 13th inst., from Mr. Justus Eck.

As there will not be a meeting of the Committee in time for the Committee to reply to this letter, we take the responsibility of answering it, as the letter in question is written by Mr. Eck under an entire misapprehension.

There has been no change whatever from the policy adopted at the Manchester Exhibition. At Manchester the supply authorities (municipal and otherwise) purchased right out 100,000 tickets, without any consideration as to whether these tickets were made use of or not.

Tickets were supplied to exhibitors on exactly similar terms, so that the procedure on the present occasion is identically the same as that adopted in Manchester, both as regards the supply authorities and the exhibitors. Moreover, no complaints were ever received by the Committee or management in respect of these conditions during or subsequent to the Manchester Exhibition.

We may add that at the Olympia Exhibition, 1905, donations were made for the purchase of tickets by the supply authorities (municipal and otherwise) to the number of over 120,000. On that occasion also no return was made in respect of unused tickets.

In point of fact, the Committee have been more liberal on the present occasion than in either of the preceding Exhibitions, inasmuch as where numbers of 1,000 tickets

have been ordered 1,300 have been sent, and charged for as 1,000; thus the 1s. tickets of admission cost the supply authorities only 2¾d., which we hope allows very fully for wastage in distribution.

In regard to Mr. Justus Eck's reference to what he considers is the high price for space rental, it may also be mentioned that the charge for space in this Exhibition is rather less than the charge for space in Manchester.

The space rentals do not exceed those made for similar exhibitions promoted by private enterprise, whereas on this occasion there will probably be a substantial rebate made to all the firms showing.

It need hardly be pointed out that this rebate would not have been possible had some of the suggestions as to the granting of free tickets and expenditure on increased advertising been adopted by the Committee.

The Electrical Exhibition.

H. L. Benjamin, *Organising Manager.*

London, E.C., *October 16th*, 1911.

The Demand for Technical Men.

The article which you publish in your last issue upon this subject is of great interest, and is quite in accordance with our experience. So far as this College is concerned, we have, for some time past, found considerable difficulty in supplying the demand made upon us for trained men, and have been able to place all our students easily, many of them before their time had actually expired, and, what is of greater general interest, at salaries considerably higher than those offered a few years ago.

On the other hand, whilst there has been for some years a steady falling-off in the number of new students, the tide turned last April, and this term we have had the largest entry in the 22 years of our existence.

Ernest A. Nash,

Secretary and Business Manager.

Faraday House, London, W.C.
October 16th, 1911.

I am rather surprised at a paper like the Electrical Review upholding such misleading advertisements as the letter in the *Daily Mail* of September 26th. Anyone who is thoroughly acquainted with the conditions of electrical engineering will see at once why this letter was written. The firm it came from have made quite a business of the premium pupil system, and I daresay have arranged their system of education so as to give their pupils a very good training; at the same time, they only do it because it pays, and if they could not make it pay they would give it up. At present they have evidently got room for more pupils than they can get, hence the letter, or rather advertisement in the *Daily Mail*, and a very good method of advertising it will prove, because it will be read by the people for whom it is intended.

As to the shortage of trained men, I think the majority of your readers will agree with me when I say that the great difficulty of managers when they want a man is not to find *one* suitable one, but to choose one from the many suitable ones. If they are short of highly trained men at the Falcon Works, Loughborough, why don't they advertise and offer a reasonable salary?

If you will refer to your advertisement columns you will find very few positions vacant at £150 per annum or over, and if ever these do appear it is only necessary to insert them once, and the advertisers will have at least a dozen men to choose from, each capable of filling a much better position if he could only get it.

As to technical training, managers appear to attach very little importance to this. I hold a City and Guilds Honours certificate myself, besides many for mechanical engineering, and I have had a good practical training, but I have competed many times for positions with men having the same practical experience, but almost no technical training, and time after time these men have been left on the short list, and got the position, and I cannot even get on the short list for a position worth £150 per annum. I have known as many as five B.Sc.'s apply for a position at 30s. per week, and yet a man with no high technical training got it. In this case the manager said they did not want B.Sc.'s, as they had tried them.

There are too many good men, and too few well-paid positions in electrical engineering, and anyone paying a premium to enter the profession will waste many valuable years as well as his money.

Aving Sum.

[If our correspondent will read the article to which he refers, he will see that we fully discounted the letter in the *Daily Mail*, on the grounds that he bases his own remarks upon. He appears to voice the central station view in particular, and it cannot be denied that this commands our sympathy; but this is only one department of the electrical industry.—Eds. E.R.]

Quartz in Electrical Heaters.

I have read the long letter from Messrs. Paterson & Co. which you print in your issue of October 6th, and it appears to me that they do not appreciate the difference between mere laboratory experiments and practical commercial achievements, such as are borne witness to at the Bastian Electric Heating Syndicate's stalls at Olympia.

Bastian has used Nichrome in his heaters for nearly two years, and I doubt if any single man has done more than he has to turn fused silica to practical account, for he has applied it in the manufacture of mercury lamps and sparking plugs, as well as electric heaters.

It is absurd to suppose that Bastian does not know all that is worth knowing about quartz, as he was experimenting with it and referred to it in his patents as far back as 1903.

Who first produced manufactured articles from fused quartz has nothing to do with the original inquiry, which raised the question as to who first used it in electric heating apparatus. I replied, and I repeat, that Bastian was the first to use it successfully. Messrs. Paterson & Co. have kindly supplied a list of unsuccessful experimenters or users of quartz for purposes entirely different from that under discussion.

But may I ask, in all innocence, who are Messrs. Paterson & Co., and why do they appear to be so angry?

Alfred A. Newman.

London, S.E., *October 10th*, 1911.

I have just seen your issue of September 22nd, and note, on page 450, Mr. Alfred A. Newman's letter, in the concluding paragraph of which he mildly criticises my application of quartz tubing to electric heating devices. I may say, in response, that in certain cases it is found desirable to close one end of the quartz tube and bring both ends of the resistance wires out at the open end. Hence the use of the small inner tube to insulate the return wire. When the quartz tube is left open at both ends, the inner tube is obviously unnecessary. My U.S. patents show both methods.

W. S. Andrews.

London, *October 16th*, 1911.

Lux Electric Candles.—The Lux Candle Co., Ltd., of London, have lately shipped 4,000 of their Lux candles for use in the Coronation festivities in India. These candles are greatly appreciated for large buildings, as they can be cleaned by anyone without removing the lamp. The firm are now making them with metal filaments up to 125 volts without bulging tops, giving an artistic effect.

Hope's "Bimetal" Fuse Wire.—We are informed that this new fuse wire, invented by Mr. Vernon Hope (the patent for which is owned by Messrs. Parmiter, Hope & Sugden), is manufactured by Simplex Condnits, Ltd., and sold by them, under licence, at the same price as by the patentees.

Belgium.—La Société des Ateliers Electrotechniques is the title of a new company which has just been formed at Mons with a capital of £4,000.

PROCEEDINGS OF INSTITUTIONS.

A New Miner's Electric Lamp with Gas-testing Device.

Some time ago we referred to the likelihood of a miner's electric lamp being produced which would have attached to it a device capable of giving an indication in some way or other of the presence of fire-damp, and this prophecy seems to have been fulfilled in the Holmes-Ralph gas-detecting portable electric lamp, illustrated below, which was exhibited before the members of the North of England Institute of Mining and Mechanical Engineers on Saturday last.

The device is really the outcome of a suggestion made by Mr. J. B. Atkinson, H.M. Inspector of Mines for the Newcastle District, to adapt the Holmes-Alderson automatic fire-damp cut-out to a portable form. As may be remembered, this apparatus—which depends for its operation upon the catalytic action of gas upon platinum, causing a rise in temperature—was intended to be used in mines near the coal face for the purpose of automatically operating a cut-off switch some distance away, thus stopping all electrical machinery in a danger zone created by a sudden outburst of gas, or in case gas was given off more quickly than it could be carried away by the ventilating current; so that credit is due to Mr. Alderson for originating an idea which may prove to be of inestimable service to the miner, and the inventors are to be congratulated upon their skill in perfecting the present arrangement.

Fig. 1 shows a portable lamp which may be used in ships' bunkers, shaft tunnels or petroleum tanks, as well as in mines, and is fitted with a small bell or buzzer, which when used in a mixture of gas and air of from 2½ per cent. upwards, commences to sound and continues to do so until the lamp is removed from the mixture.

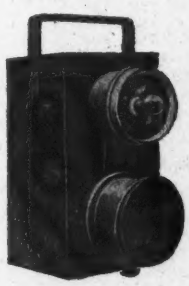


Fig. 1.—Fitted with Audible Signal.

Fig. 2.—Fitted with Cut-Out.

Holmes-Ralph Gas-Detecting Portable Electric Lamp.

In the construction of this device two compound metal strips are fixed near one another in such a manner that, under ordinary conditions, their free ends do not make contact. Underneath one of these strips is fixed in clips a short length of platinum wire, readily removable, similar to an ordinary clip-fuse, connected in series with the lamp. When additional heat is generated in the platinum by catalytic action, the compound strips touch, and thereby complete the circuit through a bell or buzzer. The use of a second compound strip, instead of a fixed contact, compensates for variations of atmospheric temperature.

To switch the light off and on, a screw in the cover is used, and any minute spark which may be generated is confined within a gauze-protected case.

Means are also provided for testing the working of the apparatus by artificially heating the platinum wire to a bright red heat. This is done by slightly unscrewing the cover, thus connecting a resistance in parallel with the lamp and increasing the current through the platinum wire. Occasional testing ensures a clean and active surface on the platinum wire.

Another form of lamp is somewhat smaller, and is shown in fig. 2. It can be readily set for various gas percentages, from 2½ per cent. upwards, and is so constructed that, when brought into action by the presence of gas, the light is either extinguished altogether or merely dimmed. The dimming of the light seems to be preferable to complete extinction, for the reason that it will afford a glimmer to enable the user to find his way about, but will, at the same time, render it impracticable for him to continue his work effectively. In order to restore the normal light, the lamp must be unlocked and a new fuse inserted, which, of course, can only be done at a relighting station.

The construction of this form of the apparatus is very similar to that already described; the bell or buzzer is absent and an ordinary tin or lead-wire fuse employed, which, upon the compound strips making contact, is connected direct across the battery, and at once melts. In the ordinary way this melting of the fuse would extinguish the light; but, by connecting a wire of high resistance across the fuse terminals, a current still passes, although much reduced in strength. By the insertion of a new fuse the normal light is restored, and the burnt-out fuse-holders are so adapted as to be easily re-wired.

As in the buzzer type a clean and active surface on the platinum wire can be maintained, and the proper working of all parts tested, by occasionally connecting a resistance in parallel with the lamp. This is very simply and conveniently done by means of a holder provided with two contact-studs, which are connected together in the handle by a suitable resistance wire. By applying these contact-studs to two points of the detector, the platinum wire is raised to a bright red heat, and the apparatus so caused to operate.

A somewhat more elaborate form of apparatus, capable not merely of detecting gas, but of showing the actual percentage present, for the use of officials in mines, is shown in figs. 3 and 4.

The principle is that the lamp, or a non-catalytic wire, is connected in series with a length of platinum wire, and a small differential galvanometer or voltmeter is connected up to three points of the circuit, namely, to the two battery ends and to the

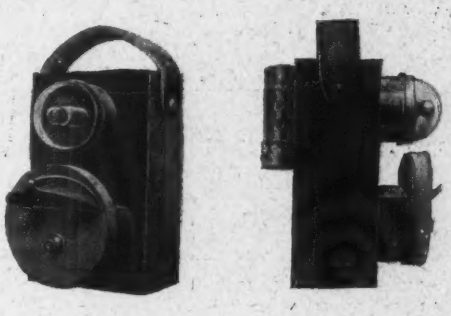


Fig. 3.—Front View. Fig. 4.—Side View.

Holmes-Ralph Gas-Detecting Portable Electric Lamp, Fitted with Indicator.

junction between the lamp and the platinum wire, as shown in the diagram fig. 5. The voltmeter has two coils, so connected that when the currents in each are equal, no movement is produced on the pointer and moving portion of the instrument. The length and resistance of the platinum wire are so proportioned to the resistance of the lamp or the other wire that, under normal conditions, the fall of potential is equal in both, and therefore the currents in the two coils of the instrument are equal.

When, however, the resistance of the platinum wire increases, as it will when the temperature increases, owing to catalytic action, the current passing is slightly reduced, the voltage across the lamp or wire becomes less, and the voltage across the platinum wire increases. Currents of different strengths will then pass through the two coils of the instrument, the moving system of which will be deflected, such deflection being shown by the pointer. The scale across which the pointer moves can be graduated to read directly the percentage of gas present. As arranged at present, this instrument will read up to about 4 per cent., the scale being

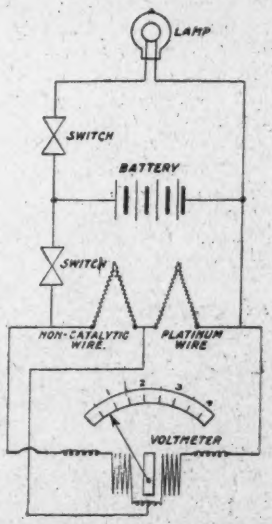


Fig. 5.—Diagram of Connections of the Holmes-Ralph Fire-Damp Indicator.

marked for each ½ per cent. Quite a readable deflection is produced by so small an amount of gas as ½ per cent. The instrument can, however, be readily arranged to read, say, from 1½ to 6 per cent., if the recording of such small percentages as a quarter and a half is not required.

It has, for two reasons, been thought advisable to mount the platinum wire in a separate gauze-protected cylinder (fig. 4), instead of putting it in the instrument case. One is, that the platinum is more accessible for renewal, should this become necessary, and the other, that the instrument case can then be sealed up to prevent moisture from getting in, and to prevent it from being tampered with.

A hinged cover (fig. 3) is provided for the protection of the glass dial, the cover also acting as a reflector to throw the light on the dial, and as a mirror in which the movement of the pointer may be seen if the lamp is held below the line of vision.

The platinum is mounted on a holder, which slips into spring-clip contacts, and is readily removable. To screen it from draught, it is protected by a thin asbestos tube, placed within the gauze-lined tube.

The effect of petrol vapour, instead of coal gas, is of interest, the presence of the vapour being clearly indicated, as are also other gases or vapours, such as ether, turpentine, benzene, &c.

In conclusion, it has been stated that the absence of means for detecting inflammable gas has been one of the chief factors in retarding the adoption of electric lamps for mining work; and it is hoped that the apparatus described may prove a step towards the ultimate replacement of the so-called "safety" oil lamp by one lighted by electricity.

NEW PATENTS APPLIED FOR, 1911.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. W. P. Thompson & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

21,639. "Telephone apparatus." F. L. Muirhead. October 2nd.

21,647. "Electrodes for arc lamps." W. R. Ridings. October 2nd.

21,649. "Automatic electric switching apparatus." A. J. Howard and A. C. Allen. October 2nd.

21,662. "Protective devices for electric distribution systems." British Thomson-Houston Co., Ltd., and J. Witcher. (Divided Application on 17,177, July 19th 1910). October 2nd.

21,678. "Plug and socket connections used on electric lighting or pow circuits." A. P. Lundberg, G. C. Lundberg and P. A. Lundberg. Octob 2nd. (Complete.)

21,687. "Systems of electrical distribution." Siemens Bros. Dynamo Works, Ltd., and H. D. Cook. October 2nd.

21,692. "Storage battery electrodes." H. C. Hubbell. October 2nd. (Complete.)

21,720. "Apparatus for electrically bonding rails or the like." E. Vedovelli. October 2nd. (Complete.)

21,735. "Arc lamps." W. R. Ridings. October 3rd.

21,755. "Magneto machines." W. H. Moore. October 3rd.

21,765. "Driving gear for the cam shafts or for the magneto-electric ignition devices of internal-combustion engines and the like." A. H. Burnand. October 3rd. (Complete.)

21,783. "Storage-battery electrodes." H. C. Hubbell. October 3rd. (Complete.)

21,784. "Storage-battery electrodes." H. C. Hubbell. October 3rd. (Complete.)

21,795. "Electric sparking apparatus for internal-combustion engines." Unterberg & Helme (Firm of). (Convention date, October 11th, 1910, Germany.) October 3rd. (Complete.)

21,796. "Self-regulating dynamo-electric generators with variable speed." T. G. S. Rogers. October 3rd.

21,800. "Controllers for electric motors." W. B. Bennett. October 3rd.

21,806. "Electromagnetic reciprocating motors." W. E. Lake. (Dulles-Baldwin Electric Drill Co., United States.) October 3rd. (Complete.)

21,812. "Telephone or like instruments." W. H. Derriman. (Automatic Enunciator Co., United States.) October 3rd. (Complete.)

21,814. "Telephone or like instruments." W. H. Derriman. (Automatic Enunciator Co., United States.) October 3rd. (Complete.)

21,815. "Telephone systems." W. H. Derriman. (Automatic Enunciator Co., United States.) October 3rd. (Complete.)

21,827. "Vapour electric apparatus." P. C. Hewitt. October 3rd.

21,828. "Vapour electric apparatus." P. C. Hewitt. October 3rd.

21,829. "Apparatus for sterilising liquids by ultra-violet rays." A. Helbronner and M. von Recklinghausen. (Divided application on 23,078, May 1st, 1910.) October 3rd. (Complete.)

21,844. "Device for the ordering (by electrical and mechanical means) of refreshments and the like." F. Croft and H. Swaby. October 4th.

21,868. "Railway block telegraph indicator." A. T. Blackall and C. Jacob. October 4th.

21,869. "Vacuum electric retort." A. T. Smith. October 4th.

21,873. "Electrically controlled railway signals and the like." Siemens and Halske Akt-Ges. (Convention date, November 4th, 1910, Germany.) October 4th. (Complete.)

21,881. "Luminous electric devices." L. H. Walter. October 4th.

21,883. "Electrical conductors placed in air tubes." T. Petersen and Anchor Cable Co., Ltd. October 4th.

21,908. "Circuit interruptors." F. W. Harris. (Convention date, October 8th, 1910, United States.) October 4th. (Complete.)

21,904. "Vapour electric apparatus." P. C. Hewitt. October 4th.

21,911. "System of electric advertising." L. S. Thorp. October 4th.

21,913. "Dynamo-electric machines for mine exploding." Sterling Telephone and Electric Co., Ltd. (Schaffler & Co., Austria.) (Addition to 22,648/1907. October 4th. (Complete.)

21,924. "Common battery telephone systems." Aktiebolaget L. M. Ericsson & Co. (Convention date, October 7th, 1910, Sweden.) October 4th. (Complete.)

21,942. "Electric welding machines." British Insulated and Helsby Cables, Ltd., and P. Bucher. (Divided application on 26,478/1910. November 15th.) October 5th.

21,954. "Release attachment for electromagnetic separators." H. G. Richardson. October 5th.

21,967. "Apparatus for recording leakage to earth from electrical conductors." Anderson, Boyes & Co., Ltd., and A. Anderson. October 5th.

21,987. "Insulating compositions." British Thomson-Houston Co., Ltd. (General Electric Co., United States.) October 5th.

22,001. "Electric cookers." R. Haddan. (Copeman Electric Stove Co., United States.) October 5th. (Complete.)

22,011. "Primary batteries." H. Reynolds. October 6th.

22,031. "Construction of electrically-heated oven." Veritys, Ltd., and A. Fletcher. October 6th. (Complete.)

22,046. "Telephone switchboards." E. S. McLarn. (Convention date, October 7th, 1910, United States.) October 6th. (Complete.)

22,049. "Telephone transmitters." C. E. Egner and J. G. Holmstrom. October 6th. (Complete.)

22,053. "System of alternating magnetic flux applicable to magneto-electric machines and to alternate-current machines." Societe d'Electricite "Nilmelior." (Convention date, October 8th, 1910, France.) October 6th. Complete.)

22,068. "Process and machine for making perforated strips with check impressions in type, or for electrically translating perforated strips into type-writing." Siemens Bros. & Co., Ltd. (Siemens & Halske Akt.-Ges., Germany.) October 6th. (Complete.)

22,079. "Means or apparatus for electrically transmitting and receiving messages." A. T. M. Johnson, F. H. Varley and Johnson Secret Wireless Telegraph and Telephone Testing Syndicate, Ltd. October 6th.

22,094. "Means for adapting electrically or otherwise propelled road vehicles to run on tramway or like rails." E. Cross. October 7th.

22,098. "Electrical safety railway appliance." G. W. Bowett. October 7th.

22,111. "Electrically-heated sad irons." H. J. C. Forrester. (Diamond Electric Co., U.S.) October 7th. (Complete.)

22,123. "Electric signalling apparatus." E. Hermsdorf. (Conventon date, October 19th, 1910, Germany.) October 7th. (Complete.)

22,127. "Systems of electric distribution." British Thomson-Houston Co., Ltd. (General Electric Co., United States.) October 7th,

22,138. "Couplings for electric conductors." A. J. Buckland. October 7th.

22,141. "Electrolytic deposition of metals, particularly upon iron and steel surfaces." P. Marino and Q. Marino. October 7th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of Messrs. W. P. Thompson & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1910.

Electric Selective Systems for Operating Printing Telegraphs, Type-Setting Machines, and Similar Devices. C. R. Jones. 14,484. June 15th. (Cognate application, No. 21,503 of 1910.)

Process of Producing Metals and Alloys by Smelting in Electric Furnaces. Ampere Ges. and Prof. Dr. E. Müller. 21,603. September 16th.

Switches for use with Electrical Heating and other Apparatus. A. F. Berry. 21,943. September 21st.

Railways or Tramways using a Slot Conduit. A. K. Jack. 22,120. September 23rd.

Coin-Controlled Mechanism for Governing the Supply of Gas or Electricity. A. W. Glover and George Glover & Co. 25,172. October 29th.

Electric Motors and their Application to the Rectification of Alternating Electric Currents. J. S. Montgomery. 25,385. November 1st.

Arrangement for Varying the Tuning of the Receivers of Electrical Apparatus for Operating or Stopping a Number of Machines and other Devices from a Distance. C. Wirth and C. Beck. 28,973. December 13th. (Addition to No. 5,811 of 1909.)

Automatic Feed Regulators for Regulating the Voltage of Alternating Currents, Single or Polyphase Circuits. B. P. R. Rucker. 30,054. December 28th.

Apparatus for the Electrical Purification of Gases. J. Y. Johnson. (Badische Anilin & Soda Fabrik.) 30,194. December 29th.

1911.

Electric Supervision of Railway Points. Siemens Bros. & Co. (Siemens and Halske Akt.-Ges.) 774. January 11th.

Method of Hermetically Sealing Electrical Conductors through or into Hard Vitreous Substances. C. B. Burnside. 1,880. January 25th.

Automatic Commutator for Radio-Telegraphic Plants with Indirect Excitation. E. Girardeau. 3,946. February 16th. (July 30th, 1910.)

Electric Illuminating Bodies. G. Weissmann. 3,950. February 16th. (February 17th, 1910.)

Electric Switches. G. S. Weymouth. 4,922. February 27th.

Reversing Switch for Electric Hub-Motors for Automobile Vehicles. V. Harborn. 5,871. March 8th. (March 13th, 1910.)

Apparatus for Transforming Continuous Currents into Alternating Currents. Ozonair, Ltd., and E. L. Joseph. 7,295. March 23rd.

Arrangement for Producing Slightly Damped Electric Oscillations. B. Macku. 8,524. April 5th. (May 2nd, 1910.)

Arrangement for Producing Slightly Damped Electric Oscillations. Ges. für Drahtlose Telegraphie. 8,712. April 7th. (November 2nd, 1910.)

Hot-Wire Electric Measuring Instruments. Hartmann & Braun Akt.-Ges. 10,056. April 25th. (June 3rd, 1910.)

Method of Mounting, Receiving and Transmitting Apparatus in Radio-Telegraphic Stations. E. Girardeau. 11,999. May 18th. (May 28th, 1910.)

Automatic Electric Switches. R. F. Venner and R. C. Griesbach. 13,103. May 31st.

Method of Using Electric Batteries for Supplying Lamps. Chemische Fabrik Griesheim-Elektron. 15,447. July 3rd. (August 2nd, 1910.)

Exhibition at Rugby.—Messrs. Linnell & Son, Ltd., electrical engineers, Rugby, are arranging an electrical exhibition at the Municipal Buildings under the direct patronage of the U.D.C. Electricity Supply Committee. It is to be held on November 9th, 10th, 11th; the buildings have been taken for a week, and special terms regarding free space, &c., are being made with firm's who desire to exhibit and to keep their manufactures distinct.

Case of Fraud.—Archibald Bryce was, at Paisley Sheriff Court, on Friday last, charged with having furnished the Clyde Valley Electrical Power Co. with fraudulent time-sheets while acting as the company's district engineer in Barrhead, and appropriating to his own use seven weeks' payments amounting to £8 2s. 2d. Sheriff Lyall passed sentence of two months' imprisonment.